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Lighting Effects vs. Lighting Fixtures

Suggestions for Demonstration Room to Awaken Householders to an Appreciation of Possibilities of Good Lighting in the Home—Second of a Series of Articles on Residential Lighting

By M. LUCKIESH
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On surveying lighting accessories one is impressed with the advantages which the scientist and engineer have taken of various means of controlling light. The flickering oil lamp in the lighthouse of a century ago has been replaced by concentrated light sources and very elaborate optical devices. Accurate geometrical forms have been made from transmitting and reflecting material for the control of light in searchlights, headlights, projection lanterns and street lamps. In the purely utilitarian field of industrial lighting, reflectors are designed to distribute the light in the desired manner. In fact, on all sides one is confronted with the utilization of knowledge for the control of light in order that the latter may be distributed, diffused or directed as desired.

In lighting fixtures for the home and for other interiors the distribution and diffusion of light is also quite important, but the requirements are not founded upon pure utility. They are based upon the more subtle and elusive artistic or, more broadly, psychological aspects of lighting. However, it is apparent on viewing such lighting fixtures in residences and in similar interiors that the fixture designer has been generally concerned only with the artistic consideration of the fixtures. The result has been that we have a great variety of such fixtures, often aimless objects fabricated from metal, glass and textiles.

There is no excuse for not utilizing the scientific expediencies in controlling light and then clothing this skeleton in an artistic dress. But further, the requirements and possibilities of lighting effects in the home and in similar interiors should be borne in mind in providing distribution, diffusion and tinting of the light. Until the fixture designer co-ordinates science with his art and above all appreciates the importance of lighting effects, we will continue to have a vast variety of fixtures which have no other aim in life than to be mere objects.

A decorator may develop a pleasing scheme for a room and if he has charge of the lighting it is not uncommon for him to design beautiful fixtures which may be works of art but which have no definite aim in harmonizing a lighting effect with a decorative scheme. Until the fixture designer, the decorator and the fixture dealer realize that, by varying the lighting, various effects may be produced in the same room, the householder cannot be expected to appreciate the potentiality of lighting. The requirements of a living room are quite different than those of the dining room; still it is not uncommon to find the same types of fixtures in both. Furthermore, with the present inadequacy of wiring and aimlessness of fixtures it is impossible for the householder to awaken to the possibilities of lighting. If he could be confronted with different lighting effects in his own home this variety would arouse interest, even though his education along these lines was neglected.

Fixtures provided with two circuits are more

How Dealers Can Show Lighting Effects

This article is a plea for demonstrating lighting effects, because description fails to reach the householder. It contains definite suggestions for fitting up a room for demonstration purposes.

Such a room must play a part in the new era of residential lighting, for it has proved its superiority to other methods. The fixture dealer will find the greatest use for it, and the central-station company will find it an effective means for arousing the householder from his indifference toward lighting in the home.

But those in touch with the householder must do more. They must awaken themselves to the great possibilities now held forth in the field of residential lighting. They must broaden their views. They must become lighting artists and enter the residence as well equipped as the decorator. Possessing the most potential medium—lighting—they will, as lighting artists, do much to make the house a home.

desirable than fixtures with one circuit, but in the former case advantage should be taken of the possibility of variety in distribution of light; that is, the two circuits should provide two different effects. This is a principle which at present is included in a few fixtures, but it should be utilized in a great many more. In fact, thought should be given to the possibility of obtaining several effects from the same fixture because the requirements of the home demand a variety of lighting effects.

Householders Make Selection from Forest of Fixtures.

The householder is dependent very largely upon the fixture dealer for his fixtures, but when he visits the fixture store to light his home he is generally confronted with a vast forest of fixtures. Few of these are supplied with lamps or connected with the lighting circuit, but if all of them were connected there would be little possibility for seeing the effects produced by any of them owing to the lack of proper environment. Generally the fixture dealer makes no effort to show lighting effects. In fact, his discussion is confined almost entirely to fixtures which are displayed as objects. Nearly every fixture dealer, by his discussion and his display of fixtures, will condemn himself to a lack of realization that these objects, although they may be beautiful, are not considered as a means to an end. The householder is shown this fixture and that one amid a mass of fixtures, and it is not surprising that he has not learned that lighting fixtures are of less importance than lighting effects.

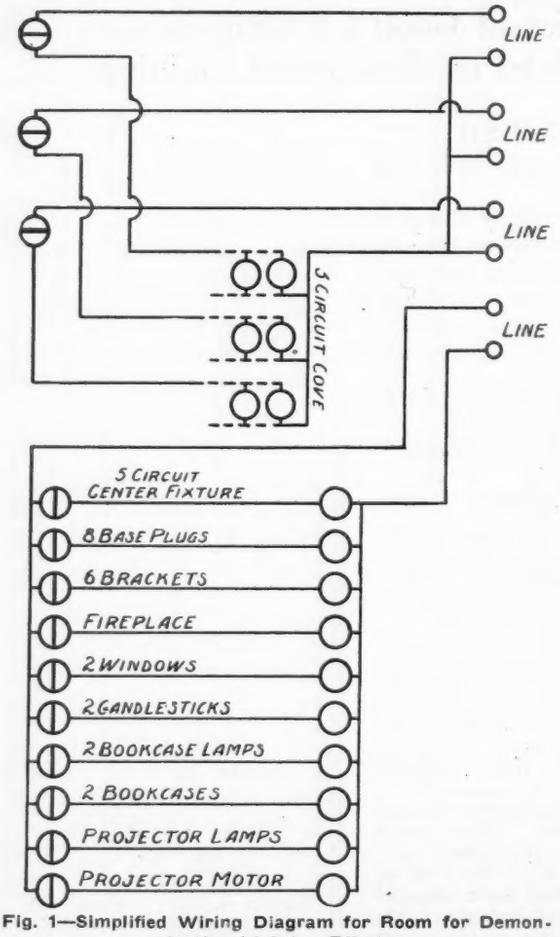


Fig. 1—Simplified Wiring Diagram for Room for Demonstrating Lighting Effects.

The fixture salesman ordinarily does not display a competence in handling lighting comparable to that shown by the decorator in handling his media. A visit to a few of the leading fixture dealers in any city will convince one that the fixture salesman does not have the broad view of lighting which is essential to really light a home. He points out this fixture and that and talks about periods, finishes and prices. He makes little effort to delve deeply into the psychology of lighting and to co-ordinate the lighting effects with the decorator's schemes in the rooms for which fixtures are being considered by the householder. When semi-indirect bowls came into existence, owing to the increasing brightness of lamps and the necessity for shading them, they were sold promiscuously for various rooms in a home. It must be evident that a similar lighting effect is not desirable throughout the home and it must be more evident that the same lighting effect is not appropriate for various rooms whose requirements differ very widely.

Need of Demonstration Room for Showing Lighting Effects.

It is highly important that the fixture dealer demonstrate lighting effects if he expects to awaken the householder to a proper appreciation of the possibilities and importance of lighting in the home. Having been convinced years ago that demonstrations are greatly superior to descriptions of lighting effects, a demonstration room has been built and operated for two years. The results obtained with several thousand visitors justify the statements made pertaining to the importance of lighting effects and to the effectiveness of demonstrations. It is proposed to describe this room briefly, but before doing so a suggestion will be made pertaining to its use by the fixture dealer.

The large display room of the fixture store may be considered to be cut into three parts. The first is the demonstration room and this should be about 16 ft. by 24 ft., although one 14 ft. by 20 ft. is effective. The next section may be about the same size and finish, but instead of being furnished it is made into about 10 to 14 open booths with the open ends toward the inner part of the room. These booths may be made about 6 ft. square by building partitions from floor to ceiling which separate them from each other.

If all the residence lighting fixtures available at the present time are classified according to lighting effects it is difficult to find more than about a dozen classes. These various types, such as a shower, wall brackets, a semi-indirect bowl, a dome or a portable lamp, are each given a place in an individual booth.

After the customer has been shown the possibilities of lighting in the demonstration room he comes into this room and from a central position he may see the lighting effect of one type after another. He may even compare one with another. Finishes, actual period style and such factors are details that may be easily determined by the rooms to be lighted and by the expense

The lighting artist thus has an opportunity to

convince the householder in the demonstration room of his ability to light the residence or rooms in question. From this point on, the householder will be more willing to provide adequately for lighting his home. With confidence in the lighting artist, catalogs will supply what has previously been supplied by a large display of fixtures. The remaining third of the original room may contain a reduced display of fixtures.

With such rooms in operation it is natural for the householder to come with his plans for a new home, and herein lies the final great opportunity of the fixture dealer. Adequate wiring will be approved readily by the householder who has witnessed an adequate demonstration of the possibilities of lighting. Through experience with such a room presented by trained persons it is apparent that the lighting artist can succeed in a small shop with only the demonstration rooms; that is, without the usual investment in display fixtures.

Years of experience in demonstrating lighting effects and two years' experience with a room specifically designed to show the possibilities of lighting in the home are behind the statement that the householder will not appreciate lighting to its full extent unless he witnesses its possibilities.

The demonstrator must be skilled in principles of decoration and furnishing for the home and must sense the broader aspects of lighting. He must be able to co-ordinate light and the other elements which make rooms expressive. In other words, he must be a lighting artist. There is material available for him to study, and it is hoped that this series of articles will afford a view into the potentiality of lighting in the home.

Requirements and Layout of Typical Demonstration Room.

There are many unique lighting effects which may be introduced into a demonstration room, but the first requirement is to maintain the appearance of a room in a residence. That is, the variety of effects must be obtained without having the appearance of a fixture display. Little should be left to the imagination of the customer. It has been found that a combination living room and dining room is quite satisfactory, and with appropriate furnishings and fixtures all the problems of home lighting may be discussed by means of demonstrations. A circular table in the center of the room is satisfactory as a center table in the living room and also serves as a dining table.

The room should be done in light and medium warm grays, for such a room is very sensitive to lighting effects. A fireplace with electric lamps of an orange-red color submerged in a basket of real coal provides a homelike touch. Bookcases also serve to make the room more like a home and these may contain various lighting stunts. The furniture may also be of light gray upholstered with a material of subdued color. Dull blue in the upholstering serves to keep the warmth of the grays alive. The floor may be covered by a rose taupe plain carpet.

Lighting equipment which demonstrate a vast variety of effects are described in the following and the simplified wiring diagram for such a

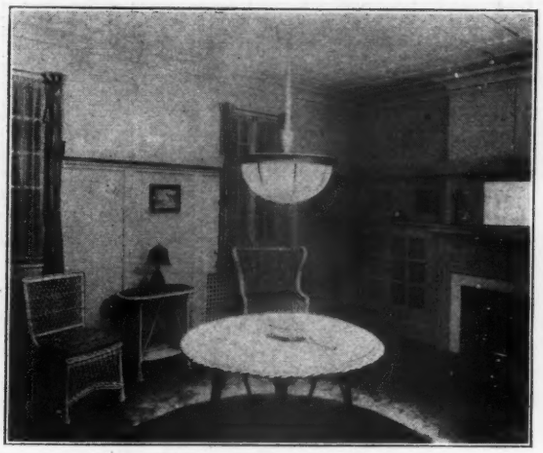


Fig. 2—Illustrating the Dining-Room Table Lighted with a Dominant Direct Component Confined to the Table, the Remainder of the Room Being Illuminated to a Low Intensity by Diffused Light of a Warm Tint.

room is shown in Fig. 1. All the lighting effects are controlled by means of switches in one corner.

Six or eight baseboard outlets are desirable for use in connecting up portable units.

Two small lamps are also desirable, one on each of the built-in bookcases.

Two shaded candlesticks over the fireplace serve to demonstrate the principle of fixtures for a mirror, such as that of a dressing table or in the bathroom.

A cove containing three circuits of clear, bluish and warm yellow lamps, respectively, serves to demonstrate this kind of lighting from concealed sources and also the charming secondary effects of tinted light. The two tints, namely, blue and warm yellow, may be shown independently; when combined they produce a rose tint.

The center fixture should contain at least three circuits. It can be made of a dense glass bowl with an aperture about 4 ins. in diameter at the bottom for providing a direct component upon the table.* Inverted silvered reflectors (three or four), containing 25-watt or 40-watt lamps, provide an indirect component. Three or four small lamps may light the bowl. Besides these three

*"The Lighting Art," by M. Luckiesh, p. 141; McGraw-Hill Book Co., New York.

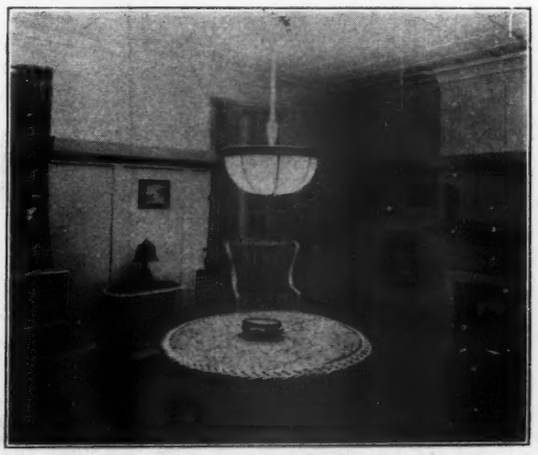


Fig. 3—Illustrating the Lighting Effect Resulting from a Dominant Upward Component from a Central Fixture.

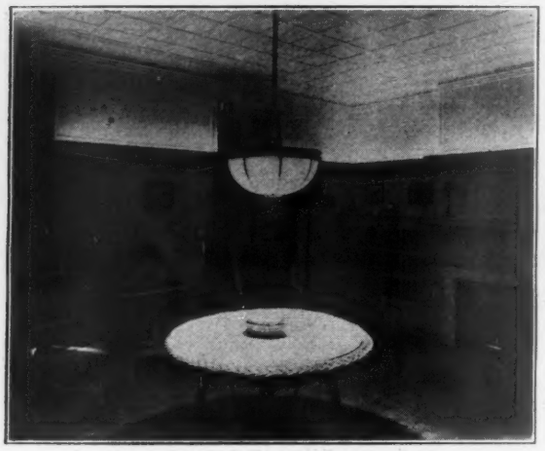


Fig. 4—The Effect Illustrated in Fig. 2 Augmented by a Secondary Effect of Tinted Light from the Cove.

circuits two others are desirable if the charm of tinted light, such as lamps simulating the color of the candle flame, is to be demonstrated.

Windows on one side of the room aid in making the room appear like a room in a home. These may be lighted from behind by means of Mazda C-2 (daylight) lamps.

In lieu of a cove a number of "flower-boxes" may be used.

In various panels unique lighting stunts may be placed.

Over the fireplace in the central panel a special translucent screen upon which lantern slides are projected from an automatic projector in the rear provides much interest. In this manner the demonstration may be extended to the lighting of other interiors or the previous achievements of the lighting artist may be shown.

The bookcases may contain displays of lamps or glassware visible only when the doors are open. It is always interesting to show a picture alternately lighted by means of ordinary light and by artificial daylight or a piece of statuary lighted from different directions. These can readily be placed in the bookcases. It is found that such details are instructive as well as catchy.

The room may be easily built of composition board and finished with a paint of a dull surface. The wiring may be concealed behind this construction and provision should be made for accessibility behind the walls and over the ceiling.

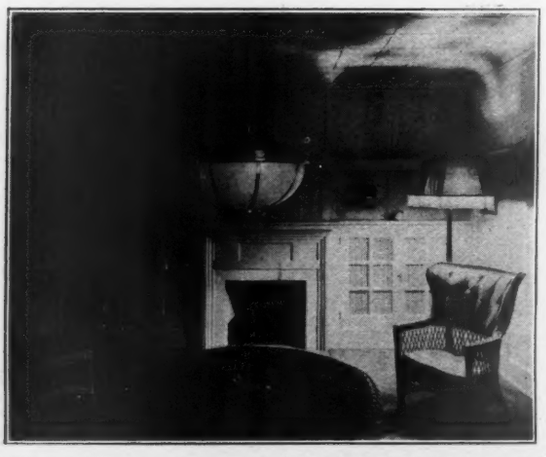


Fig. 5—Illustrating the Different Mood Obtained with the Direct Component or Localized Lighting from a Portable Lamp.

It is difficult to give an idea of lighting effects by means of photographs and half-tone illustrations owing to the limitations of these processes. The charm of color, which incidentally possesses extensive possibilities in the home, is entirely lacking in the half-tone illustrations. Nevertheless, a few of them may indicate the variety of effects obtained.

Effects Obtained by Use of Equipment in Demonstration Room.

In Fig. 2 the downward component from the central fixture is operative. This may simulate the desired effect in a dining room. In the central panel over the fireplace a picture is shown projected from the compact automatic apparatus in the rear. When these pictures are not being shown the panel appears of the same gray flat tone as the other panels as indicated in the illustrations.

In Fig. 3 only the "indirect" and "semi-indirect" components of the central fixture are operative. By alternating the effects shown in Figs. 2 and 3 it is easy to convince the visitor

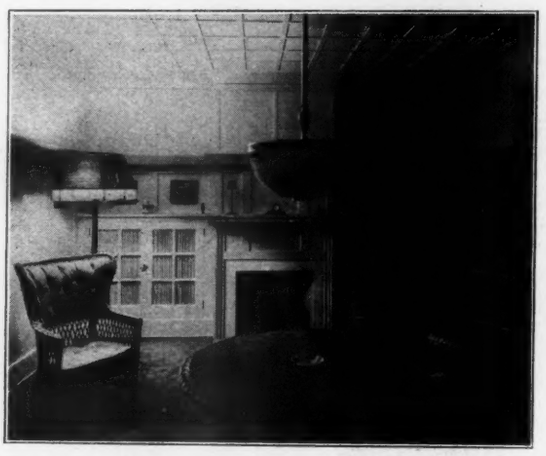


Fig. 6—The Effect Illustrated in Fig. 5 Augmented by the Addition of an Upward Component from the Same Portable Lamp.

that the dining table, for example, is more appropriately lighted by a dominant downward component.

In Fig. 4 the effect shown in Fig. 2 is augmented by a secondary lighting from the cove. By altering this tint of the cove-lighting, the delights of tinted light are demonstrated as well as the psychological effects of color.

In Fig. 5 the coziness of localized lighting by means of a portable lamp convinces the visitor that portable lamps are desirable for living rooms and various other places where restful effects are desired for reading.

In Fig. 6 is shown the effect of adding the upward component of the same portable to that of the direct component (Fig. 5). This provides ample general lighting for the room when it is being considered as a living room. By lighting the various portables, the element of variety in lighting is effectively demonstrated.

The first article of this series by M. Luckiesh on residential lighting appeared in our issue of March 6. The next article, which will appear April 10, will deal with the lighting of living rooms and will include illustrated suggestions for such lighting.

Wiring for "So Much per Outlet"

Figures Show That Better Way Is to Make Price Based on Totaling Items of Work Done on Installation—More Outlets Will Be Result

By J. W. COLLINS

Secretary, Electrical Contractors' Association of City of Chicago.

Did you ever hear of many contractors who used any other unit except the outlet as a cost or selling price for a house wiring installation? Ask contractors as to the market for their wares and nearly every one of them will say: "So much an outlet." The system is wrong, and is keeping the contractor better acquainted with the credit manager than the sales manager, and is the reason why so many customers get a half-done job.

The number of outlets should not be used as a basis for setting a price on a job, any more than counting the buttons on a coat gives a cost or selling price on the garment. There is something else, in either case, that materially affects the value.

If all that the contractor sold every time he did a wiring job was outlets it would be very well, provided they were all of the same kind and cost as much to install in each case. But actually this condition never exists. There must always be a service installation, meter loops, etc., and how the cost of these can be lumped and put into a price per outlet is a mystery.

The following system of estimating a job illustrates this point. For example, take a two-story, ordinary residence, wired during construction, leaving out the convenient outlets on the first estimate and adding them after arriving at average specification cost. This cost is based on Chicago conditions and form of construction, namely, $1 per hour for mechanics, complete grounded systems of conduit for new buildings, and armored cable or conduit for existing buildings.

The building is to be wired for 30 lamps, 18 on the first floor and 12 on the second, from 22 ceiling and wall outlets, 1 baseboard outlet and 4 switches.

TYPICAL HOUSE-WIRING ESTIMATE.

1 two-wire No. 14 service installation	$ 8.70
1 meter outlet	2.58
2 first-story circuits at $4.28	8.56
1 second-story circuit	5.45
18 ceiling outlets, at $2.72	48.96
4 bracket outlets, at $3.20	12.80
1 baseboard outlet	4.30
4 single-pole switches, at $3.59	14.36
Inspection	1.00
Total labor, material and inspection	$106.71

In looking over this estimate, it is found that the number of lamps can be increased to 41 (figuring 40 watts per socket and 15 amperes maximum load) without additional service cost, the meter connection remaining the same. There can be added 12 lamps on the first floor and 4 on the second without increasing the number of circuits. Accordingly, the customer can be sold 12 outlets on the first floor and 4 on the second floor, at a cost of $2.72 for ceiling, $3.20 for bracket and $4.30 for baseboard outlets. In some cases the cost can be lowered one-third by suggesting these baseboard or wall outlets be installed on the same wall in rooms where the original plans call for switches and brackets, or suggesting their installation back to back in rooms having the same dividing wall.

If the first estimate is divided by the number of outlets the cost shows $3.92 per outlet. If 1 to 16 more ceiling outlets are added to the job, these can be installed at a cost of $2.72 per outlet. The cost of the baseboard or wall receptacles can be reduced from the average cost to very little more than the cost of the ceiling outlets if a little judgment is injected into the sales argument, along lines similar to those stated in the previous paragraph.

The cost per outlet is reduced by securing additional outlets, because practically 25% of the job cost is constant between 30 and 41 lights. If 4 additional ceiling outlets, 2 brackets, 3 baseboard outlets and 2 switches are added the total cost is $143.07, or $3.76 per outlet, if they are averaged. In this case a number of expensive outlets have been added and still the cost per outlet for the job is less than the original estimate.

If the customer is sold on the basis of so much per outlet, naturally he will want to reduce the number to a minimum. If, instead, he is told what kind of an installation is needed, what convenience the additional outlets will give, and then what the whole job will cost, he is more than likely to be sold on that basis. Each outlet is part of the job and not a unit of price.

Additional Outlets Mean More Business for the Contractor-Dealer.

The reason contractors do not get the work of installing convenient outlets is because they do not fully analyze their jobs. Convenient outlets are boosted out of existence, in spite of the fact that if they were treated fairly they would soon appear in the original specification and thereby give both the customer and the contractor a complete job and the best seller of appliances. That, in turn, will demand more convenient outlets.

The same principal holds true in the wiring of existing buildings, except there is a better opportunity of including convenient outlets. This class of work is free from the architect's specifications and the feeling of the owner that architect's specifications are all that is necessary. If contractors would keep in mind that additional outlets, located conveniently with reference to the main installation, could be included at a low cost and that their existence prompts their use, a never-ending source of revenue will result by way of appliance sales. This should take the

place of the feeling that every job is a closed incident when the original wiring is completed.

This brings us to the class of work that should be very desirable, and this is the call for or suggestion of added outlets to existing installations. At the present time over half of the contractors doing house wiring do everything but refuse this class of work. It is claimed that the cost of handling wiring of this sort is so excessive that to render a bill at a profit creates dissatisfaction and unusually severs business relations.

However, the contractor-dealer should never overlook a call for repairs or the one-outlet job. The existing building must be brought up to date to establish the use of numerous convenient outlets in the new buildings. A bell repair or a one-outlet job, in many cases, will result in a frequent sale of appliances and receptacles.

For instance, the average wall receptacle, fished in with armored cable at $1 per hour for labor, is about $4.20. On top of this there is a man-shift cost of about $2 and inspection cost of $1. In total, with a profit, the price of installing this receptacle would be about $10. Now if a little salesmanship was used it might be found that an outlet in the kitchen for the flatiron, an outlet in the dining room for the grill or toaster, an outlet in the bedroom for the dresser lamps, curling iron or heating pad, and outlets in the living room and hall for the lamp or vacuum cleaner might be installed while the contractor was on the job. If four outlets of this nature were installed instead of the one originally planned by the customer, it is found that this number of outlets can be sold for $7.40 each, because the man-shift time and inspection remain the same in both cases.

Besides reducing their cost, each one of the additional outlets installed represents an opportunity for the sale of an appliance and will illustrate the point that every hundred dollars' worth of wiring gives a fertile field for double that amount of sales of electrical devices if the wiring makes their use convenient.

DETROIT EDISON CO. TO BUILD NEW $2,000,000 POWER PLANT.

The Detroit Edison Co. will soon start construction work on the new Marysville (Mich.) power plant at Bunce Creek, on the banks of the St. Clair river about seven miles south of Port Huron, Mich. According to the plans of the company the Marysville station will eventually have a capacity of 130,000 kw., or more than either the Connors Creek or Delray plants of the company, which now supply the major part of Detroit's light and power.

In discussing the proposed improvement, A. C. Marshall, vice-president of the Detroit Edison Co., said: "We expect to go ahead without delay in the construction of the new plant and ought to be supplying Port Huron and Marysville and points elsewhere along the St. Clair river, or in the 'Thumb' district of Michigan, within a period of about one year. At this time we will build the Marysville station to a capacity of 40,000 kw., which is enough electrical energy to supply the entire river section."

The Marysville station, when completed, will represent an expenditure of about $2,000,000, Detroit Edison Co. officials state. Marysville is a suburb of Port Huron and has recently become the site of several large manufacturing enterprises, among them a new automobile company organized by C. Harold Wills and others formerly connected with the Ford Motor Co. interests.

EMPLOYES TO GET SHARES IN PENNSYLVANIA CENTRAL STATION.

Employes of the Pittsburgh, Butler & Harmony Consolidated Railway & Power Co. and its subsidiaries will be given $1,000,000 worth of stock by the company and allowed to select three of their number to represent them on the board of directors of the company. The men named as directors will have a voice in the management of the corporation. About 400 employes are involved in the plan.

David L. McCahill, principal owner of the company, evolved the plan and has asked the employes to aid in the gathering of data and statistics relative to period of service of each man so that the plan may be put in operation at an early date.

The $1,000,000 face value of common stock is to be set aside under a trust agreement with a bank or trust company, and certificates are to be issued to the employes. The fund which would result from the accrued dividends is to be divided equally among all the employes, so that each will be interested in keeping down the number of employes to as few as possible, because the greater the number of employes the less amount each would receive. Mr. McCahill proposes to try his plan for five years. The Pittsburgh, Butler & Harmony Consolidated Railway & Power Co. is capitalized at $6,300,000, with $1,800,000 in preferred and $4,500,000 in common stock.

LYNN SECTION HEARS PAPER ON "FUNDAMENTAL FACTORS."

D. B. Rushmore spoke before the Lynn (Mass.) Section of the American Institute of Electrical Engineers on March 17 on "Some Fundamental Factors of Industry." The talk included electrical matters, leading to a discussion of often unconsidered common things. Mr. Rushmore advocated the study of economics and referred to a prominent official of the General Electric Co. whose active life has been along engineering lines but who spends his spare time in the study of economics. The speaker held that the industry of invention and research is the greatest of all industries.

CHICAGO ENGINEERS SEE VIEWS OF NIAGARA FALLS POWER.

William M. White, hydraulic engineer of Allis-Chalmers Co., Milwaukee, Wis., was the speaker at the ladies' night dinner held by the Chicago Section of the American Society of Mechanical Engineers, at the Hotel Morrison, Chicago, on March 19. Mr. White spoke on the hydraulic development around Niagara Falls and showed motion pictures of the installation of Unit No. 16 at Niagara Power Co. No. 3 powerhouse, this being the largest turbine in the world.

Direct-Current Armature Windings

Definitions, Formulas and Methods of Calculating Different Types of Windings, with Diagrams and Connecting Tables

By JACOB GINTZ

All direct-current armature windings come under two heads: lap or parallel windings, and wave or series windings. These are again divided into minor types known as simplex, duplex and triplex windings, etc., singly re-entrant, doubly re-entrant and triply re-entrant windings, etc.

Types of Windings.

Any winding in which there are as many circuits as there are poles and requiring as many brushes as poles for successful operation is called a lap or parallel winding.

Any winding in which there are but two circuits regardless of the number of poles or brushes is called a wave or series winding.

A winding which is wound with one wire in hand is called a simplex winding.

A winding which is wound with two wires in hand, or where there are two simplex windings placed on the same armature, is called a duplex winding.

A winding which is wound with three wires in hand, or where there are three simplex windings placed on the same armature, is called a triplex winding.

A winding which encircles the armature once and then closes on itself is called a singly re-entrant winding. Any number of coils may be used in this style of winding.

A winding which encircles the armature twice and then closes on itself is called a doubly re-entrant winding. In this style of winding only an odd number of coils can be used.

A winding which encircles the armature three times and then closes on itself is called a triply re-entrant winding. In this style of winding only an odd number of coils may be used, which are not multiples of three.

Ring-wound armatures are not used in any of the modern motors or generators, so this article will be devoted entirely to the discussion of drum wound armatures.

The windings that are placed on drum-wound armatures have their coils placed so that while one side is active under a north pole the other side is active under a south pole. From this it will be seen that for each turn of wire in a coil there will be two active sides or conductors. By a conductor we refer to that part of a turn which is in the slot of the armature, cuts lines of force and produces an electromotive force.

Coil Pitch or Spread.

The distance or part of the armature circumference that a coil spreads is known as the coil pitch or coil spread. This distance is expressed in a certain number of winding spaces. A winding space may be represented by an entire slot or by only a fractional part of a slot, depending entirely on the number of coils in the winding and the number of slots in the armature core. If there are half as many coils as there are slots in the armature there will be but one coil side per slot, and it will be called a one-layer or a one-coil-per-slot winding, and each slot will be considered as one winding space. If the number of coils and slots in the armature core are equal there will be two coil sides per slot, and it will be called a two-layer or a two-coil-per-slot winding, and each slot will be considered as two winding spaces.

Symbols Used in Calculating Windings.

The following are the symbols and their meanings that will be used in the various formulas in connection with the above mentioned windings.

Y_b = coil pitch, expressed in number of winding spaces. If it is an even number it must be made odd by + or — 1.

Y_f = front pitch, which is the distance expressed in a number of winding spaces, from the end of one coil to the beginning of the next.

Y_r = resultant pitch, which is two winding spaces in all singly re-entrant windings; four winding spaces in all doubly re-entrant windings; and six in all triply re-entrant windings.

C = whole number of coils in the winding.

A = number of pairs of armature circuits.

P = number of pairs of poles.

The following are the two formulas used in any drum winding.

$$Y_b = \frac{C \pm A}{P} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$Y_f = Y_b \pm Y_r \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2)$$

In formula (1) if the + value of A is used it is called the long pitch, and if the — value of A is used it is called the short pitch. In formula (2) the use of the + value of Y_r will result in a left-hand winding, in which the beginning of coil No. 2 will be to the left of the beginning of coil No. 1. The use of the — value of Y_r will result in a right-hand winding, in which the beginning of coil No. 2 is to the right of the beginning of coil No. 1.

Lap or Parallel Windings.

The first windings to be treated will be of the lap or parallel types of the various classes and styles mentioned above. For the first winding assume a winding of the simplex singly re-entrant lap wound type for a two-pole armature having eight coils, and one layer or one coil side per slot.

There are two methods of showing winding diagrams. One is known as a working drawing or end view and the other is known as a development. By applying the above two formulas the winding diagrams shown in Figs. 1 and 4 will be worked out.

As stated in the above problem, there will be

eight coils in the winding and one layer or coil side per slot. The number of slots required in the armature is found as follows:

$$\text{No. of slots} = \frac{\text{No. of coils} \times 2}{\text{No. of coil sides per slot}} = \frac{8 \times 2}{1} = 16.$$

By using formula (1) the coil spread or coil pitch will be found. The numeral values of the different symbols are: $C = 8$; $A = 1$; $P = 1$. That is, there are eight coils in the winding and in a two-pole winding there is one pair of poles. As mentioned above, any winding of the lap type

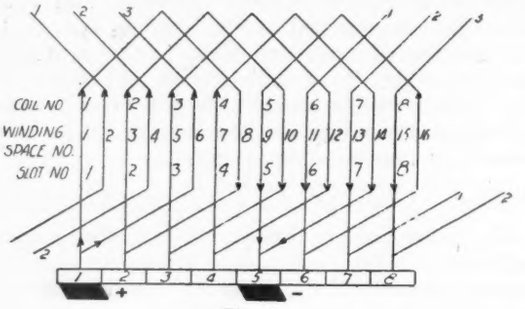


Fig. 1.

must have as many circuits as poles, then there will also be one pair of armature circuits; their $Y_b = (C \pm A)/P = (8 \pm 1)/1 = 9$ or 7 winding spaces for the value of Y_b. By using formula (2) the front pitch will be found. $Y_f = Y_b \pm Y_r = 9 \pm 2 = 11$ or 7, and $7 \pm 2 = 9$ or 5 for the values of Y_f.

By examining the above results it will be seen that there are four different ways or steps by which this armature can be wound: first, $Y_b = 9$, $Y_f = 11$; second, $Y_b = 9$, $Y_f = 7$; third, $Y_b = 7$, $Y_f = 9$; fourth, $Y_b = 7$, $Y_f = 5$. Since all four windings are possible and will work equally well, it will be necessary for the winder to use a little judgment. The winding which can be used to the best advantage is the fourth one mentioned above, where $Y_b = 7$ and $Y_f = 5$. In this winding the least amount of material will be used and this in turn will reduce the cost of manufacture.

Fig. 1 is the development of this winding, and by following and comparing the winding and connecting table it can easily be understood.

WINDING TABLE.

Coil No.	Wound in spaces No.	In slots No.
1	1 and 8	1 and 8
2	3 and 10	3 and 10
3	5 and 12	5 and 12
4	7 and 14	7 and 14
5	9 and 16	9 and 16
6	11 and 2	11 and 2
7	13 and 4	13 and 4
8	15 and 6	15 and 6

When the entire eight coils have been placed into the armature according to this table, the winder is then ready to connect the winding to the commutator. The number of bars in the commutator must be equal to the number of active coils in the winding, so, for this reason there will be eight bars in the commutator to which the winding will be connected.

Before a winder can make proper connections between the commutator bars and the winding he must know how the brushes are going to be set in relation to the pole pieces. The usual position of the brushes is that they are set center between pole tips, or center off the pole.

When the brushes are set center between the pole tips, the beginning lead of each coil will be connected to the commutator bar straight out in front of the slot in which the coil begins.

When the brushes are set center off the pole the beginning lead of each coil will be connected to the commutator bar, which is 90 electrical degrees to the right or left of straight away.

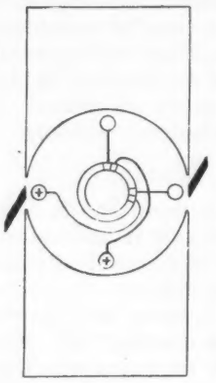


Fig. 2.

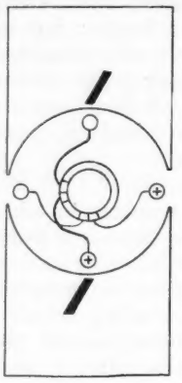


Fig. 3.

The reason for these connections is that the coils will be commutated at the proper time; that is, when they are in their neutral position. Figs. 2 and 3 will illustrate these connections and brush positions.

Assuming that the brushes are set center between pole tips, the connections of the winding in Fig. 1 are made as shown in the following connecting table:

CONNECTING TABLE.

Beginning of Coil No.	Connected to Bar No.	End of Coil No.	Connected to Bar No.
1	1	1	2
2	2	2	3
3	3	3	4
4	4	4	5
5	5	5	6
6	6	6	7
7	7	7	8
8	8	8	1

Fig. 4 is the working drawing or end view of the same winding as Fig. 1.

The next step is to find how far the brushes

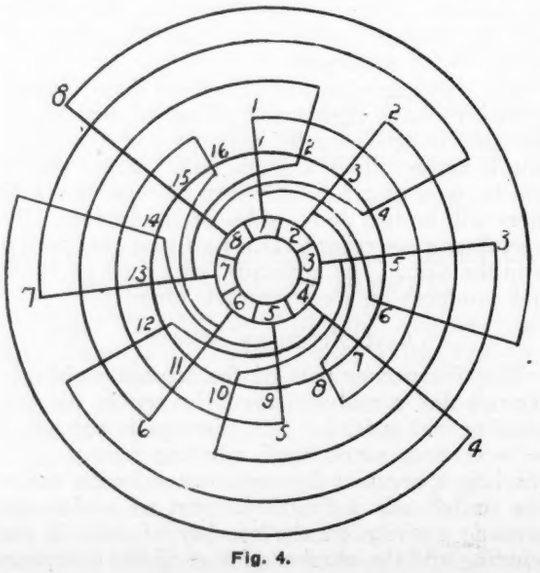


Fig. 4.

will be spaced apart. This is found by the following formula:

$$\text{Spacing} = \frac{\text{No. of com. bars}}{\text{No. of poles}} = \frac{8}{2} = 4 \text{ bars.}$$

By placing one brush at commutator bar No. 1, the next brush would be placed on the fourth bar away or bar No. 5. They may be called positive or negative at will.

Assume that this armature is that belonging to a motor; the current will then enter the winding through the positive brush and leave through the negative brush. By following the indicating arrow points through the winding it will be seen that the winding is divided into two paths or circuits, and that each path or circuit contains four coils in series. If the reader will make a careful study of the foregoing he should have very little trouble with the following windings.

Two-Pole Simplex Singly Re-entrant Lap Winding.

The next winding to be discussed will be that of a two-pole simplex single re-entrant lap winding having 16 coils and two layers or two coil sides per slot. To find the number of slots in the armature use the following:

$$\text{No. of slots} = \frac{\text{No. of coils} \times 2}{\text{No. of coil sides per slot}} = \frac{16 \times 2}{2} = 16.$$

By following the same rules as were laid down for the winding in Figs. 1 and 4, the spread or coil pitch will be found as follows:

$$Y_b = \frac{C \pm A}{P} = \frac{16 \pm 1}{1} = 17 \text{ or } 15 \text{ winding spaces.}$$

$$Y_f = Y_b \pm Y_r = 17 \pm 2 = 19 \text{ or } 15, \text{ and } 15 \pm 2 = 17 \text{ or } 13$$

As previously explained, there are four possible windings for each armature. The same holds true in this case, and the winding which will result the most advantageous is where $Y_b = 15$ and $Y_f = 13$. These values were used in constructing Figs. 5 and 6, and the winding tables are as follows:

WINDING TABLE.

Coil No.	Wound in spaces No.	In slots No.
1	1 and 16	1 and 8
2	3 and 18	2 and 9
3	5 and 20	3 and 10
4	7 and 22	4 and 11
5	9 and 24	5 and 12
6	11 and 26	6 and 13
7	13 and 28	7 and 14
8	15 and 30	8 and 15
9	17 and 32	9 and 16
10	19 and 2	10 and 1
11	21 and 4	11 and 2
12	23 and 6	12 and 3
13	25 and 8	13 and 4
14	27 and 10	14 and 5
15	29 and 12	15 and 6
16	31 and 14	16 and 7

When all coils are placed according to the above table they are then connected to the commutator bars. Assume that the brushes are set center off pole as shown in Fig. 3, then the connections are made as follows:

The first step is to line up the commutator to find which bar is straight in front of any given slot. This is done by the following method. Take a piece of string, place it over the center of a slot, pass it out over the commutator and down over the center of the centering hole in the end of the shaft; the bar the string rests on will be commutator bar No. 1, as shown in Fig. 6.

To find the number of commutator bars to be counted to the right or left to swing the lead 90 electrical degrees, use the following method or formula:

$$\text{No. of bars} = \frac{\text{No. of com. bars}}{2 \times \text{No. of poles}} = \frac{16}{2 \times 2} = 4.$$

Should the above formula result in a mixed number, say, 4½ bars, it would be increased to the next higher whole number, or 5 bars. This

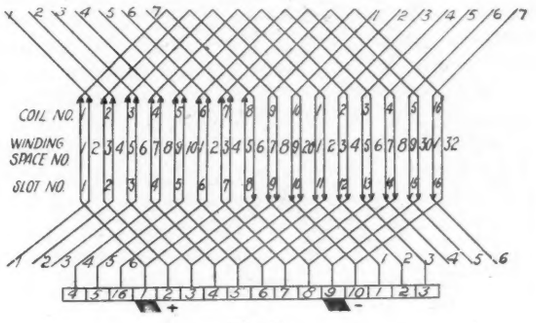


Fig. 5.

will hold true regardless of the size of the fraction. By following this rule the winding of Fig. 5 will be connected as shown by the following connecting table:

CONNECTING TABLE.

Beginning of Coil No.	Connected to Bar No.	End of Coil No.	Connected to Bar No.
1	5	1	6
2	6	2	7
3	7	3	8
4	8	4	9
5	9	5	10
6	10	6	11
7	11	7	12
8	12	8	13
9	13	9	14
10	14	10	15
11	15	11	16
12	16	12	1
13	1	13	2
14	2	14	3
15	3	15	4
16	4	16	5

When all coils in the winding have been connected according to the above table, the spacing of brushes will be found as follows:

$$\frac{\text{Com. bars}}{\text{No. of poles}} = \frac{16}{2} = 8 \text{ bars.}$$

One brush will be placed on any commutator bar and the other on the eighth commutator bar away from it. Assume that this is the winding on the armature of a generator, the current will enter the winding through the negative brush

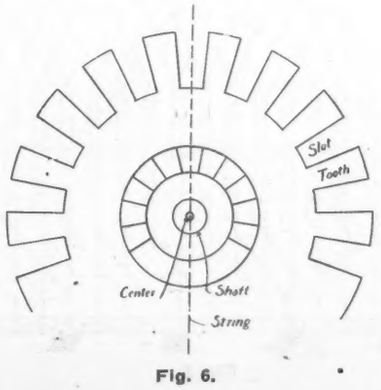


Fig. 6.

and leave through the positive brush. By following the arrow points in Fig. 5, it will be seen that one-half of the total number of coils (eight coils) are in series in each path or circuit of the winding. Fig. 7 is the working drawing or end view of the same winding.

Four-Pole Simplex Singly Re-entrant Lap Winding.

The next winding to be discussed will be a four-pole simplex singly re-entrant lap winding

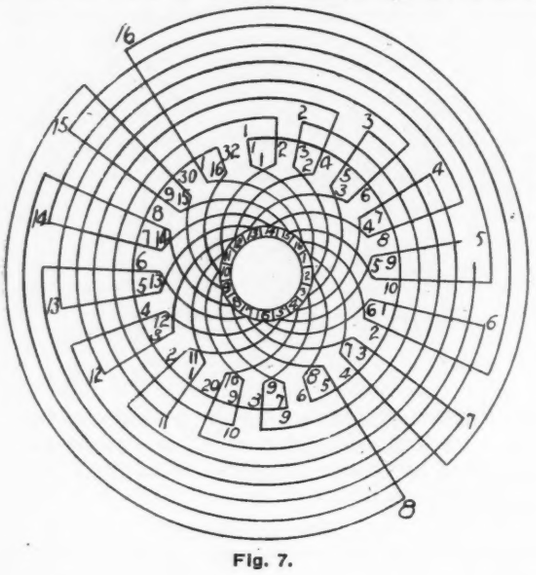


Fig. 7.

of 16 coils, two layer or two coil sides per shot. The number of slots required in the armature will be the same as in the previous problem, as the number of coils in the winding and the number of coil sides per slot are the same.

To find the numerical values of Y_b and Y_f use the following: $C = 16$, $A = 2$, $P = 2$. (This being a four-pole winding, there will be two pairs of poles and also two pairs of armature circuits; hence $A = 2$ and $P = 2$.)

$$Y_b = \frac{C \pm A}{P} = \frac{16 \pm 2}{2} = \frac{18 \text{ or } 14}{2}$$

$= 9$ or 7 winding spaces.

$Y_f = Y_b \pm Y_r = 9 \pm 2 = 11$ or 7, and

$7 \pm 2 = 9$ or 5 winding spaces

By the same method as used before, $Y_b = 7$ and $Y_f = 5$ winding spaces will be the values used for this winding.

The following winding table will show the location of the coils in the slots and also the number of the winding space they occupy.

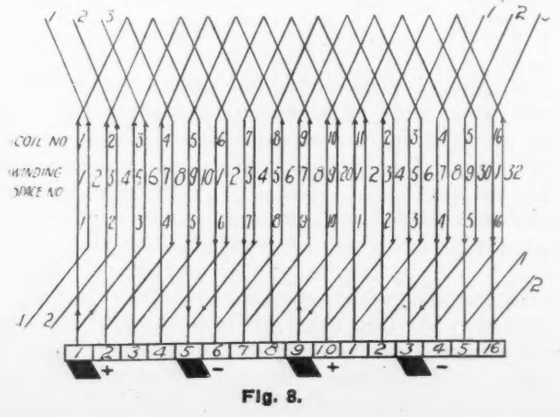


Fig. 8.

WINDING TABLE.

Coil No.	Wound in spaces No.	In slots No.
1	1 and 8	1 and 4
2	3 and 10	2 and 5
3	5 and 12	3 and 6
4	7 and 14	4 and 7
5	9 and 16	5 and 8
6	11 and 18	6 and 9
7	13 and 20	7 and 10
8	15 and 22	8 and 11
9	17 and 24	9 and 12
10	19 and 26	10 and 13
11	21 and 28	11 and 14
12	23 and 30	12 and 15
13	25 and 32	13 and 16
14	27 and 2	14 and 1
15	29 and 4	15 and 2
16	31 and 6	16 and 3

When all the coils have been into the armature the next step is to connect the winding to the commutator bars. Assuming that the brushes are set center between the pole tips, then the connections are made as shown in the connecting table. Fig. 8 is the development and Fig. 9 is the working drawing or end view of this problem.

CONNECTING TABLE.

Coil No.	Beginning to Bar No.	End to Bar No.
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6
6	6	7
7	7	8
8	8	9
9	9	10
10	10	11
11	11	12
12	12	13
13	13	14
14	14	15
15	15	16
16	16	1

On this winding for successful operation it will require four brushes on the commutator (two negative and two positive). The spacing of these brushes will be found as follows:

$$\frac{\text{No. of com. bars}}{\text{No. of poles}} = \frac{16}{4} = 4 \text{ bars.}$$

Set one brush on commutator bar No. 1. and on the fourth bar away, or No. 5, set the second brush; on the fourth bar from these, or bar No. 9, set the third brush, and on the fourth bar from this, or bar No. 13, set the fourth brush. Call the first and third brush positive, and the second and fourth brush negative. Assuming that the winding on this armature is for a motor, the current will enter the winding through the positive brushes and divide into two pair or four paths or circuits through the winding. By following the arrow points in Fig. 8, these paths or circuits can be traced.

Brushes per Pole.

It was previously stated that in all lap windings it is necessary to have as many brushes as poles for successful operation. Figs. 10, 11 and 12 will illustrate how the current is equally divided when the proper number of brushes are used; also what will happen if only three brushes on a four-pole lap winding are making contact on the commutator, and also what will happen if only two brushes in a four-pole machine make contact.

Fig. 10 shows a four-pole winding carrying a load of 40 ampers. This amount of current

reaches point *A*, where the feeder connects to the bus bar which connects both positive brushes. The current of 40 amperes divides at point *A* and then 20 amperes will flow to each positive brush. All paths or circuits through the armature winding have approximately the same resistance, so for this reason the current as it enters the armature winding again divides so that

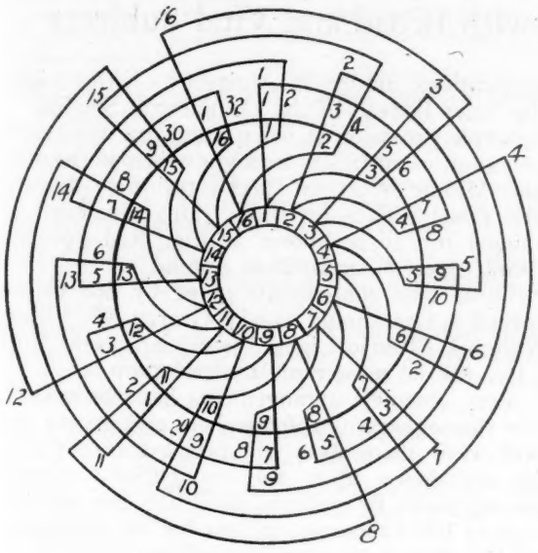


Fig. 9.

10 amperes will flow through each path or circuit of the winding. This shows that the full-load current taken by the machine is equally divided between the various paths or circuits of the winding, uniting again at point *B* and flowing back on the line through the negative brushes.

Fig. 11 shows the same armature winding with one of the positive brushes removed. The machine is assumed to be driving the same load as in Fig. 10, consequently 40 amperes are still flowing, but the internal dividing of the current has changed. The current having but one positive brush through which to enter the winding will flow as follows: Owing to the opposition of induced counter-electromotive forces in the two paths, or circuits *A* and *B*, the current will divide into two parts, and 20 amperes will flow through the remaining two circuits, as shown in Fig. 11. This shows that the removal of one brush, either negative or positive, the winding in this four-pole machine will be overloaded by 100%, which will cause the winding to heat intensely, and if kept in operation burn out.

In Fig. 12 is shown the extreme condition of a four-pole lap winding having one pair of brushes removed (one negative and one positive brush). The load driven by the machine is unchanged, but the flow of the current through the internal circuits of the winding is very much out of proportion. The current entering the armature winding through the positive brush divides into two paths or circuits; one path has one-quarter of the winding in series, while the other path has three-fourths of the winding in series. This will cause the current to divide unequally according to the resistance of the circuits; then the amount of current that would flow through the circuit with one-quarter of the winding in series would be three times as great as the current flowing through the circuit with three-fourths of the winding in series. The current would then divide as follows: 30 amperes will flow through one path or circuit, while 10 amperes would flow through the other circuit. It is now seen that the removal of one pair of brushes in a four-pole lap wound armature will overload the winding by 200%.

On large machines of, say, 10 or 12-pole upwards, one brush may be removed at a time for cleaning or renewal without danger, since the larger the number of brushes the smaller the percentage of overload becomes.

RADIO LECTURE DEALS WITH U. S. NAVY RECEIVING EQUIPMENT.

At a meeting of the Radio Club in New York City, March 26, L. C. F. Horle, expert radio aide at the navy yard, Washington, D. C., read a paper entitled "Navy Receiving Equipment," in which he entered into the design, construction and theory of modern radio receiving equipment. Apparatus was exhibited and the lecture was illustrated with lantern slides. The meeting was held in the engineering building at Columbia University.

SOCIETY OF INDUSTRIAL ENGINEERS MEETS IN PHILADELPHIA.

The spring meeting of the Society of Industrial Engineers was held in Philadelphia, Pa., March 24-26 and was devoted to readings of papers and discussions on the general subject of "The Practical Application of the Principles of Industrial Engineering." Between the sessions held at the Bellevue-Stratford hotel, inspection trips were made to a number of Philadelphia industrial plants.

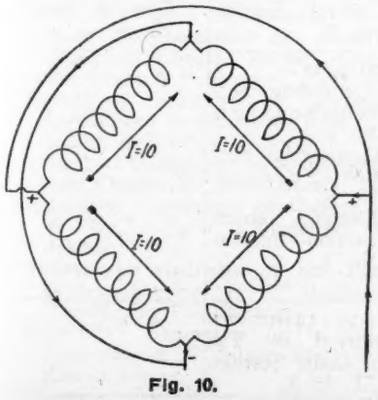


Fig. 10.

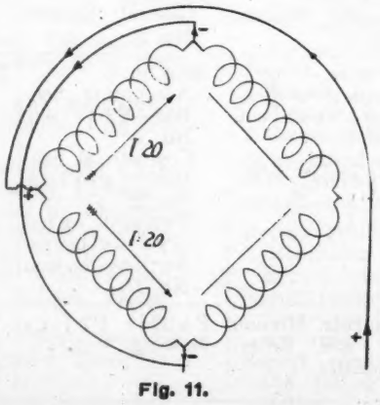


Fig. 11.

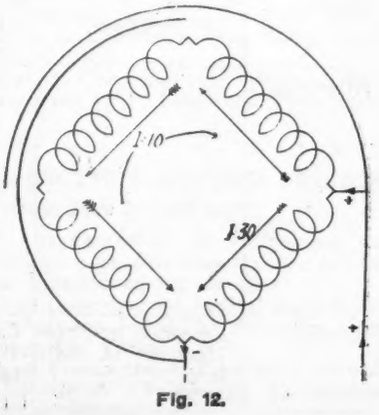


Fig. 12.

Program for Pasadena Convention of N. E. L. A.

Program of Annual Meeting of National Electric Light Association Indicates Busy Sessions Concerned with Broad and Vital Subjects

Subjects of vital interest to the industry feature the program of the 43rd annual convention of the National Electric Light Association, to be held at the Hotel Huntington in Pasadena, Calif., May 18 to 22, a tentative draft of which has been prepared with the possibility of but few minor changes before the first session. Carefully selected subjects have been systematically scheduled so that matters of broad, major importance will be presented in the general morning sessions, while the more specialized subjects will be considered in detail at the afternoon sessions of the four sections of the association.

Following the president's reception Tuesday evening, May 18, the convention will open promptly at 9:30 o'clock Wednesday morning. There will be general sessions on each morning of the convention, the Wednesday morning session commencing at 9:30 and the other three sessions at 9 a. m.

During the four days of the convention there will be eight sessions of the four sections. The Accounting Section will hold two sessions, the Commercial Section three sessions, the Electric Vehicle Section one session, and the Technical and Hydroelectric Section two sessions. These sessions, some of which will run concurrently, will be called to order promptly at 2:30 p. m. The Public Policy session will be held Thursday evening.

Because of the great distance from electrical manufacturing centers, the difficulties of transportation, supply and demand conditions and lack of suitable space, the customary exhibition will be omitted. There will be, however, an unusually interesting exhibition and demonstration of industrial lighting equipment and its applications, under the auspices of the Lighting Sales Bureau of the Commercial Section.

Ample provision is being made for the transportation of members and guests from the East and Middle West by special trains to the Pacific Coast. Thus far three trains have been arranged for, to be known as the "Red Special," "Pink Special" and "Blue Special."

Those who contemplate going by one of the special trains should notify George W. Elliott, National Electric Light Association, New York City, who is master of transportation.

Very complete arrangements have been made for the registration of members and guests who will avail themselves of special transportation in attendance upon the convention. Similar arrangement is made to facilitate the reservation of hotel accommodations for the convention at Pasadena.

Special entertainment is being planned for the visitors, the completed program for which will be announced later. These entertainment features will include a play and other entertainment by the California Mission Wednesday evening, and an entertainment tendered by the Pacific Coast Section of the N. E. L. A. Friday evening. Delegates and guests will also be conducted on instructive tours and sight-seeing trips.

Southern California Edison men are dominant on the committees that will have in hand the success of the convention. John B. Miller is chairman of the Convention Committee, and A. E. Morphy is vice-chairman. W. L. Frost is chairman of the Entertainment Committee. S. M. Kennedy chairman of the Program Committee, A. N. Kemp chairman of the Finance Committee, A. B. Wallaber chairman of the Ho-

TENTATIVE SCHEDULE OF SESSIONS, FORTY-THIRD CONVENTION, NATIONAL ELECTRIC LIGHT ASSOCIATION, PASADENA, CAL., MAY 18-22, 1920.

	Tuesday, May 18.	Wednesday, May 19.	Thursday, May 20.	Friday, May 21.	Saturday, May 22.
Morning.	9 a. m.— Registration.	9:30 a. m.— General Session No. 1.	9 a. m.— General Session No. 2.	9 a. m.— General Session No. 3.	9 a. m.— General Session No. 4.
Afternoon.		2:30 p. m.— Commercial Section—Session No. 1. Technical and Hydroelectric Section—Session No. 1.	2:30 p. m.— Accounting Section—Session No. 1. Commercial Section—Session No. 2. Technical and Hydroelectric Section—Session No. 2.	2:30 p. m.— Accounting Section—Session No. 2. Commercial Section—Session No. 3. Electric Vehicle Section—Session No. 1.	
Evening.	Reception by President R. H. Ballard.	California Mission Play and Entertainment.	Public Policy Meeting.	Entertainment tendered by Pacific Coast Section, N. E. L. A.	

tel Arrangements Committee. M. H. Aylesworth, executive manager of the association, is chairman of the Registration Committee.

FIRST GENERAL SESSION.
Wednesday, May 19, 9:30 a.m.

Address, "Welcome to California," by Hon. William D. Stephens, governor of California.
Address by Pres. R. H. Ballard.
Appointment of committee on president's address.
Report by M. H. Aylesworth, executive manager.
Announcements.
Report of Committee on Water Power Development by Chairman Franklin T. Griffith, Portland Railway, Light & Power Co., Portland, Ore.
Report of Committee on Rate Research by Chairman Alex Dow, Detroit Edison Co., Detroit.
Report of Lamp Committee by Chairman Frank W. Smith, United Electric Light & Power Co., New York.
Report of Insurance Expert by W. H. Blood, Jr., Stone & Webster, Boston.
Address by chairman of Commercial Section, John G. Learned, Public Service Co. of Northern Illinois, Chicago.
Report of Electric Range Division of Merchandise Sales Bureau by Chairman J. Paul Clayton, Central Illinois Public Service Co., Springfield, Ill.
Adjournment.

SECOND GENERAL SESSION.
Thursday, May 20, 9 a.m.

Report of Committee on Company Sections by Chairman F. A. Birch, Philadelphia Electric Co., Philadelphia.
Report of Committee on Geographic Sections by Chairman R. J. McClelland, American Business Corp., New York.
Address by member of Lighting Service Bureau, speaker and subject to be announced later.
Report (printed) of Committee on Commercial Service and Relations with Customers by Chairman R. F. Bonsall, Consolidated Gas, Electric Light & Power Co., Baltimore.
Election of nominating committee.
Report of Committee on Constitution and By-laws by Chairman W. C. L. Eglin, Philadelphia Electric Co., Philadelphia.
Appointment of Committee on Memorials.
Appointment of Committee on Resolutions.
Report of Advertising and Publicity Service Bureau by Chairman L. D. Gibbs, Edison Electric Illuminating Co., Boston.
Paper of Committee on Service by Chairman S. M. Kennedy, Southern California Edison Co., Los Angeles.
Report of Committee on Membership by Chairman Walter Neumuller, New York Edison Co., New York.
Report of Treasurer H. C. Abell, American Light & Traction Co., New York.
Address (subject to be announced later) by E. O. Edgerton, president, California Railroad Commission, San Francisco.
Adjournment.

THIRD GENERAL SESSION.
Friday, May 21, 9 a.m.

Address by chairman Accounting Section, R. W. Symes, Detroit Edison Co., Detroit.
Report of Committee on Accounting Education by Chairman Douglas Burnett, Consolidated Gas, Electric Light & Power Co., Baltimore.
Report of Committee on Relations with Educational Institutions by Chairman John F. Gilchrist, Commonwealth Edison Co., Chicago.
Report of Committee on Accident Prevention by Chairman Charles B. Scott, Bureau of Safety, Chicago.
Report of Committee on Safety Rules by Chairman W. C. L. Eglin, Philadelphia Electric Co., Philadelphia.
Address by chairman of the Technical and Hydroelectric Section, I. E. Moultrop, Edison Electric Illuminating Co., Boston.
Report of Committee on Inductive Interference by Chairman A. E. Silver, Electric Bond & Share Co., New York.
Report of Committee on Electrification of Steam Railroads by Chairman Frank M. Kerr, Montana Power Co., Butte, Mont.
Address by member of Power Sales Bureau, speaker and subject to be announced later.
Paper by Carl D. Johnson, Wisconsin Railroad Commission.
Report of Committee on Electrical Resources of the Nation by Chairman M. S. Sloan, Brooklyn Edison Co.
Adjournment.

FOURTH GENERAL SESSION.
Saturday, May 22, 9 a.m.

Address by chairman of the Electric Vehicle Section, George B. Foster, Commonwealth Edison Co., Chicago.
Paper on "Electric Machinery for All Handling—An Opportunity" by Zenas W. Carter, secretary Material Handling Machine Manufacturers' Association, New York.
Report of Committee on Public Information by Chairman John F. Gilchrist, Commonwealth Edison Co., Chicago.
Report of Committee on Bonus Systems by Chairman Harry A. Snow, Detroit Edison Co., Detroit.
Report of Committee on Education by Chairman Fred R. Jenkins, Commonwealth Edison Co., Chicago.
Report of Committee on Insurance by Chairman E. J. Fowler, Commonwealth Edison Co., Chicago.
Report of Committee on Co-operation in the Industry by Chairman Lee H. Newbert, Pacific Gas & Electric Co., San Francisco.
Report of Committee on Sale of Company Securities to Customers and Resident Citizens by Chairman George R. Jones, Public Service Co. of Northern Illinois, Chicago.
Report of Committee on Doherty and Billings Prizes by Chairman A. S. Loizeaux, Consolidated Gas, Electric Light & Power Co., Philadelphia.
Report of Committee on President's Address.
Report of Committee on Constitutional Amendments.
Report of Committee on Memorials.
Report of Committee on Resolutions.
Report of Nominating Committee.
Election and Installation of Officers.
Adjournment.

ACCOUNTING SECTION—FIRST SESSION.
Thursday, May 20, 2:30 p.m.

Address by Section Chairman R. W. Symes, Detroit Edison Co.
Appointment of Nominating Committee.
Report (printed) of Committee on Credits and Collections by Chairman David Darlington, New York Edison Co., New York.
Report (printed) of Committee on Classification of Accounts and Accounting Relations with Other Associations by Chairman Wm. Schmidt, Jr., Consolidated Gas, Electric Light & Power Co., Baltimore.
Report of Committee on Form of Annual Reports to Commissions by Chairman W. J. Meyers, United Electric Light & Power Co., New York.
Report (printed) of Committee on Merchandising Accounting by Chairman C. W. Johnson, Public Service Electric Co., Newark, N. J.
Report (printed) of Committee on Accounting Service to Member Companies and the Monthly "Bulletin" by Chairman Frederick Smith, New York Edison Co., and Editor L. A. Coleman, United Electric Light & Power Co., New York.
Report (printed) of Committee on Motor Vehicle Records by Chairman G. P. Landwehr, Philadelphia Electric Co.
Adjournment.

ACCOUNTING SECTION—SECOND SESSION.
Friday, May 21, 2:30 p.m.

Report (printed) of Committee on Purchasing and Storeroom Accounting by Chairman W. S. Stevens, Edison Electric Illuminating Co., Boston.
Report (printed) of Committee on Federal Income Tax Procedure by Chairman H. E. Addenbrooke, Commonwealth Edison Co., Chicago.
Report (printed) of Committee on Customers' Records and Billing Methods by Chairman J. D. Jacobus, Detroit Edison Co., Detroit.

Report of nominating committee on section officers.
Election of officers and executive committee.

COMMERCIAL SECTION—FIRST SESSION.
Wednesday, May 19, 2:30 p.m.

Address by Section Chairman John G. Learned, Public Service Co. of Northern Illinois, Chicago.
Report of Finance Committee by Chairman M. S. Seelman, Brooklyn Edison Co.
Appointment of nominating committee.
Report of Committee on Constitutional Amendments by Chairman R. H. Tillman, Consolidated Gas, Electric Light & Power Co., Baltimore.
Report (printed) of Committee on Wiring by Chairman R. S. Hale, Edison Electric Illuminating Co., Boston.
Report (printed) of Merchandise Sales Bureau by Chairman E. A. Adkins, Commonwealth Edison Co., Chicago.
Report (printed) of Electrical Merchandise Division by Chairman F. D. Pembleton, Public Service Electric Co., Newark, N. J.
Report of Division of Present and Prospective Conditions of Central-Station Merchandising by Chairman Stanley A. Dennis, McGraw-Hill Co., New York.
Report (printed) of Electric Shop Management Division by Chairman C. E. Greenwood, Edison Electric Illuminating Co., Boston.
Report (printed) of Standardization and Testing Division by Chairman O. R. Hogue, Commonwealth Edison Co., Chicago.
Report of Division of Research and Sales Promotion by Chairman Walter S. Byrne, Nebraska Power Co., Omaha.
Report (printed) of Electric Range Division by Chairman J. Paul Clayton, Central Illinois Public Service Co., Springfield.
Discussion continued from general session Wednesday morning.

COMMERCIAL SECTION—SECOND SESSION.
Thursday, May 20, 2:30 p.m.

Report of Committee on Electrical Salesman's Handbook by Chairman I. Lundgaard, Rochester Gas & Electric Corp., Rochester, N. Y.
Report (printed) of Bureau of Lighting Sales by Chairman Clarence L. Law, New York Edison Co., New York.
Report (printed) of Division of Street and Railway Lighting by Chairman W. T. Dempsey, New York Edison Co.
Report of Industrial Lighting Division by Chairman H. H. Magdsick, General Electric Co., Cleveland. (Note—A demonstration entitled "A Demonstration of the New Era in Industrial Lighting" will be made in support of this report elsewhere during the convention.)
Report (printed) of the Residence Lighting Division by Chairman M. Luckiesh, General Electric Co., Cleveland.
Report of Division of Lighting of Large Buildings by Chairman G. Bertram Regar, Philadelphia Electric Co.
Report (printed) of Store Lighting Division by Chairman F. C. Taylor, Rochester Gas & Electric Corp., Rochester, N. Y.
Report (printed) of Division of Commercial Aspects of Lamp Equipment by Chairman George H. Stickney, General Electric Co., Harrison, N. J.
Discussion of preceding reports.
Report (printed) of Power Sales Bureau of Division of Economics of the Use of Central-Station Electric Power by Chairman John W. Meyer, Philadelphia Electric Co., Philadelphia.
Report (printed) of Power Sales Bureau of Division of Electrochemical Processes by Chairman C. H. McClure, Commonwealth Edison Co., Chicago.
Report (printed) of Power Sales Bureau of Division of Industrial Electric Heating by Chairman N. T. Wilcox, Mississippi River Power Co., Keokuk, Ia.

COMMERCIAL SECTION—THIRD SESSION.
Friday, May 21, 2:30 p.m.

Report (printed) of Committee on Compensation of Salesmen by Chairman Adolph Hertz, New York Edison Co., New York.
Election of officers and executive committee.
Report (printed) of Power Sales Bureau of Division of Electric Steel Furnaces by Chairman Joseph McKinley, Duquesne Light Co., Pittsburgh.
Report (printed) of Power Sales Bureau of Division of General Power by Chairman W. E. Murphy, Minneapolis General Electric Co., Minneapolis. (This report will consist of a paper by W. G. Taylor, General Electric Co., entitled "Electric Power in the Oil Fields.")
Report of Power Sales Bureau of Power Contract Division by Chairman R. H. Ashworth, Utah Power & Light Co., Salt Lake City. (This report will consist of a paper entitled "Standardization of Power-Factor Specifications in Power Contract on the Part of Central-Station Companies.")
Report of Power Sales Bureau of Isolated Plants Division by Chairman J. B. Stuart, Public Service Electric Co., Elizabeth, N. J.
Report of Power Sales Bureau of Electric Development Division by Chairman Morse Dell Plain, Northern Indiana Gas & Electric Co., Hammond, Ind.

ELECTRIC VEHICLE SECTION SESSION.
Friday, May 21, 2:30 p.m.

Address by Section Chairman George B. Foster, Commonwealth Edison Co.
Appointment of nominating committee.
Report (printed) of Committee on Legislation by Chairman G. A. Freeman, Walker Vehicle Co., Chicago.
Report of Committee on Standardization by Chairman E. R. Whitney, Commercial Truck Co. of America, Philadelphia.
Paper (printed) on "Uses and Abuses of Electric Vehicles" by H. J. Butler and W. J. Burns, Oneida Truck Co., Green Bay, Wis.
Report of Committee on Electric Vehicle and Power Sales Bureau Co-operation by Chairman E. S. Mansfield, Edison Electric Illuminating Co., Boston.
Paper on "How the Power Salesman and Electric Vehicle Representative Can Help Each Other Get More Business." (Name of author to be announced later.)
Report of Garage and Rates Committee by Chairman Willis M. Thayer, Hartford Electric Light Co., Hartford, Conn.
Report of Committee on Federal and Municipal Transportation by Chairman James H. McGraw, McGraw-Hill Co., New York.
Report of Committee on Transportation Engineering by Chairman F. M. Feiker, McGraw-Hill Co., New York.
Election of officers and executive committee.

TECHNICAL AND HYDROELECTRIC SECTION—FIRST SESSION.
Wednesday, May 19, 2:30 p.m.

Address by Section Chairman I. E. Moultrop, Edison Electric Illuminating Co., Boston.
Appointment of nominating committee.
Announcements.
Report (printed) of Meter Committee by Chairman F. V. Magalhaes, New York Edison Co., New York.
Report (printed) of Committee on Prime Movers by Chairman N. A. Carle, Public Service Electric Co., Newark, N. J.

TECHNICAL AND HYDROELECTRIC SECTION—SECOND SESSION.
Thursday, May 20, 2:30 p.m.

Election of officers and executive committee.
Report (printed) of Committee on Overhead Systems by Chairman W. K. Vanderpoel, Public Service Electric Co., Newark, N. J.
Report (printed) of Committee on Underground Systems by Chairman F. E. Ricketts, Consolidated Gas, Electric Light & Power Co., Baltimore.
Report (printed) of Committee on Electrical Apparatus by Chairman R. F. Schuchardt, Commonwealth Edison Co., Chicago.

EVENING SESSIONS.

Tuesday—Reception by Pres. R. H. Ballard.
Wednesday—California Mission play and entertainment.
Thursday—Public Policy meeting.
Friday—Entertainment tendered by Pacific Coast Section, N. E. L. A.

EDITORIAL COMMENT

Make Pure Science Attractive

The address delivered by Dr. W. R. Whitney, Director of the Research Laboratory of the General Electric Co., at the banquet of the Associated Manufacturers of Electrical Supplies, held in New York City on March 18, presented a phase of the electrical industry that is too often forgotten by those who are engaged in it. This is the purely scientific, as distinguished from the commercial and engineering phases. That the former, which always precedes, is as important as the latter can not be gainsaid. No sane individual would affirm that the apex of development in electrical apparatus has been attained. Much less would he affirm that the last law of physics has been discovered. As a matter of fact, there are immense opportunities for improvement in the machinery that makes the physical laws commercially available, and there are unknown physical laws, some of them fundamental, that are yet to be comprehended.

It is to the effort to discover the fundamental laws of nature that Dr. Whitney urged more attention and support. He spoke a proverb when he said that they are discovered in quiet laboratories by devoted scientists working without thought of reward, not in committee meetings. America has produced thousands of successful manufacturers and of engineers, but few explorers of science. Manufacturers and individuals have spent fortunes endeavoring to apply previously discovered physical laws to human advantage. Few of them, however, have given a thought to the discovery of the virgin laws. The study of these laws, made unattractive by mistaken public sentiment and non-support, has been delegated to the voluntary action of men without means in a money-mad country. As a result most of the names that adorn the pages of scientific literature are not of Americans.

More support for scientific exploration should be forthcoming. The idea of converting the schools and colleges into institutions of applied science to the exclusion of pure science is erroneous. This country never can attain preeminence in pure science until its institutions and organizations make the study of pure science attractive. It can be made attractive only when students can see a more brilliant future for scientific research than they can see at present, when the monetary support of students of pure science will be sufficient to compete with that of students of applied science or of commerce, and when the man who devotes his life to the study of a scientific phenomenon will be called a scientist rather than a "nut with a bug."

Install More Outlets in Residences

At various times during the last few years there has been agitated the matter of securing more outlets in residences and apartments. Primarily this has been prompted by the conviction that more numerous outlets would add to the convenience of the householder and thereby result in greater use of electrical household appliances. Incidentally, the wiring of such outlets would furnish a ready means of keeping construction crews busy during otherwise idle or dull times, and the resulting demand for appliances would furnish additional sales for the electric shop. Thus, since both the contracting and merchandising departments of his business would profit, there was reason to believe that the contractor-dealer would enthusiastically take up the effort to popularize additional outlets.

Some headway has been made in this direction, especially as the result of nation-wide campaign of a year or so ago for installation of more convenience outlets. And yet what has been accomplished by spasmodic efforts here and there has barely scratched the surface of these opportunities. Observation in the average residence, regardless of class, shows this to be true and in a systematic survey of residence service conducted by the progressive central-station company in Chicago recently there was disclosed not only a scarcity of convenient wall and floor outlets, but an often-expressed wish on the part of the housewives that they be provided. A variety of current taps and multiple sockets were often found in use as well as a mass of drop cords run indiscriminately along the walls and baseboards and sometimes over doors and windows into adjoining rooms. Thus the householder showed an unmistakable desire to use electric portables and appliances in spite of the usual handicap of few outlets and those quite often not readily accessible. Moreover, his willingness to utilize some of the fixture sockets for extensions showed that he valued the utility of the latter above the

lighting effect the former should have produced, and in many instances this lighting effect, as well as the appearance by day, was distinctly marred by the new use of the sockets.

A number of reasons account for this common scarcity of outlets, which is not infrequently found even in new residences and apartments of all classes except the most expensive. A fundamental error has been that houses have been wired "for electric light" instead of for "electric service," and the light has been conceived to be obtainable only from rgiidly located ceiling and bracket fixtures. In the early days this was excusable, because appliances and attractive portable lamps were scarcely known. Moreover, the wiring and lighting fixtures have been usually almost the last details settled on in a new house, after practically all the available money had been otherwise appropriated or actually spent. Even then the keen competition between contractors led them all too often to suggest further cutting down the wiring cost by curtailing the number of outlets. In wiring old buildings it was the general practice to put in almost the smallest possible number of outlets for the same reason.

Now, at last, it is beginning to dawn on many electrical contractors that this was all wrong. The average householder is fast becoming completely "sold" on the advantages of electric service. He wants it not only for lighting, but for fans, cleaners, washers and other motor-driven appliances, and for table and kitchen cooking utensils and various heating devices. Furthermore, he wants his lighting arranged so he can secure various lighting effects to suit the occasion, and this means dependence not only on unchangeable lighting fixtures but also on portable table and floor lamps and adaptable fixtures. All this calls for a generous supply of outlets.

The contractor-dealer should take the initiative in supplying them to stimulate both his wiring and sales departments. It is absurd to wait only for new construction work. Between new jobs the man can be very advantageously employed in wiring existing buildings completely, in adding new outlets and in otherwise rehabilitating old installations. In many cases the old fixtures should be discarded and modern ones installed and in more advantageous locations. But in all cases wall receptacles should be provided in generous number, supplemented by floor receptacles in large living and dining rooms. The kitchen must not be overlooked as to lighting and convenient outlets. The contractor-dealer has here a golden opportunity to keep his organization busy all the time because residences constitute the largest number of buildings in any community. But it will not do to sit down and wait for the residents to petition his services. Meet them more than half way by suggestions for new outlets, additional wiring or rewiring, new fixtures, new portables, more labor-saving appliances for the housewife, and fans and general utility devices for all the members of the household.

National Chamber of Commerce and the Electrical Industry

Recently the Chamber of Commerce of the United States of America purchased the old Washington home of Daniel Webster, situated directly across Lafayette square from the White House, and will use it as a site for a monumental structure in which to house the headquarters of the association.

In a circular sent out to prospective members by Field Manager Shepherd, it is represented that the task of the National Chamber is to present to Congress, the President and the public the business sentiment of the country on the vital business questions of the hour.

It is evident that the National Chamber is intended to be a representative body of the business world, and to be effective, it is further evident that membership in it should be held by every business organization and corporation in the nation.

At present the electrical industry is not very largely represented in the National Chamber, and if any beneficial results are to be obtained for the industry through the Chamber it is necessary that the electrical industry has enough members in the Chamber to give the industry a full representation in the activities of the organization.

Emigration of Workmen May Affect Industry

Recent reports show that workers are leaving the United States at the rate of about 1000 a day. Most of them that emigrate will not come back and few will come to replace them. Wholesale emigration of this kind will harm industry, lessen production. The electrical industry will suffer in proportion to the others.

But this very thing, in a way, may prove helpful to the industry as it will result in renewed activity in the search for, and invention of, labor-saving devices and in new applications of the use of electrical energy.

Developments during the war period proved that electricity, through its numerous applications, replaced in some measure the loss of manpower in the industrial world. It did it then and it can do it now if a real shortage of man-power results from the heavy tide of emigration.

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

ELECTRICAL COMMITTEE MEETS FOR REVISION OF CODE.

Large Number of Changes Suggested at Public Meeting Held in New York City.

The public hearing of the Electrical Committee of the National Fire Protection Assosiation for revision of the National Electrical Code was held in New York City on March 23. A closed session of the committee was held on March 24 following the public hearing. All proposed changes were codified in a bulletin which was distributed widely to those interested so that the time and work involved in considering the changes was reduced considerably.

In making preparations for the revision of the Code, the Electrical Committee divided the work among eleven standing committees, each of which had as many technical subcommittees as were necessary to accomplish the work to be done. These standing committees included one on cars and railways, Martin Schreiber, chairman; one on devices and material, A. R. Small, chairman; on fixtures, heaters, signs and lamps, J. C. Forsyth, chairman; on generators and substations, A. M. Schoen, chairman; on grounding, W. H. Blood, chairman; on industrial applications, G. S. Lawler, chairman; on outside wiring, building supply and services, Dr. M. G. Lloyd, chairman; on signaling systems, W. S Boyd, chairman; on theaters, motion pictures, places of public assembly and garages, Washington Devereux, chairman; on wiring standards and systems, W. C. Peet, chairman; and on reconciling the National Electrical Code and the National Electrical Safety Code, H. S. Wyncoop, chairman.

The Committee on Cars and Railways recommended modifications of the existing Code Rule 41 for car-house wiring, these changes applying to trolley wires, cutout switches and line breakers, lighting arresters, and other fixtures and appliances. The voltage specification for light, heat and power permits 750 volts to be used. A large amount of new matter is recommended for inclusion in the rule. Robert C. Cole objected to permitting the increase in voltage, but the chairman said that several electric railways now are using 750 volts on their switchboards.

The Committee on Devices and Materials had subcommittees on outlet boxes, on cabinets and cutout boxes, on wires and cables, and on varnished cloth insulation. The rules on outlet boxes were not changed materially. Some new paragraphs and modifications of old ones will occur in the rules promulgated for other fixtures under the jurisdiction of the standing committee. The changes recommended in the Code are acceptable to the National Electric Light Association, which suggested that the terms employed in the rules be arranged so as not to deter people by a feeling of fright from using household appliances.

Only slight modification of the present rule was recommended by the Committee on Generating and Substations, while several changes were recommended by the Committee on Grounding. The most important change suggested was that of raising the voltage limit to 750 for motors and generators before grounding is necessary. Some discussion over the comparative merits of grounding or insulating generator frames took place. Howard S. Warren suggested that it would be better to make grounding or insulating optional for frames when the voltages are less than 150. R. L. Young stated that it is preferable and safer to insulate frames of generators or motors used by telephone companies because the voltages are small and there is a necessity of cleaning brushes at intervals. Joseph Sachs, Dr. M. G. Lloyd, E. C. Horton, Timothy C. O'Hearn, C. G. Durfee and Prof. W. L. Smith entered into a discussion of the desirable number of grounds and arrangement.

The changes recommended by the Committee on Industrial Applications causing most comment referred to the protection of motors and of operatives from uncovered switches. Criticism developed about the mandatory form of the proposed specification for protecting motors from overload. The suggestion was made that the overload limit should not be specified too definitely because many loads are extremely variable. A preference for 25% overload limit was suggested by several speakers, among whom were R. L. Young, Carlton L. Kennedy, W. E. Date, George A. Burnham, Granville E. Palmer, John A. Hoeveler, Dr. A. W. Colcord and Prof. W. L. Smith.

The report of the Committee on Outside Wiring, which comprised four large subcommittees, contained several modifications of the present rules relating to wires and transformers. The principal criticism was that the changes will cause unnecessary expense for additional service switches for small installations. The rules for oil transformers also were criticised. J. C. Forsyth, chairman of the Subcommittee on Transformer Installations, stated, however, that the rules were intended to protect the transformers from fires in the building and to protect the property from burning transformers, and were prepared in collaboration with several transformer manufacturers. The report was discussed by A. A. Pape, P. H. Bartlett, George E. Bruen and Dr. M. G. Lloyd.

The chairman of the Committee on Signalling Systems stated that Rule 85 had been largely reconstructed. It will be of more interest to the amateur radio stations than to the large professional kind. The discussion centered on spark gaps and their value. According to Prof. W. L. Smith, A. Waldschmidt and Thomas H. Day,

their value is doubtful. The length of ground wire is an important item to be considered.

Not much discussion occurred about the reports of the Committee on Theaters, etc., and the Committee on Wiring Standards and Systems, although extensive changes in the rules are recommended. Some difference of opinion appeared to exist about the advisability of installing small farm lighting and power units with voltages less than 110. S. Keilholtz argued for the lower voltages and W. H. Blood, Jr., supported the 110-volt standard.

The report of the Committee on Reconciling the National Electrical Code and the National Electrical Safety Code was read by title but was not discussed.

The meeting was in charge of Dana Pierce, chairman, and Ralph Sweetland, secretary of the Electrical Committee.

ELECTROCHEMICAL SOCIETY WILL MEET IN BOSTON.

Symposiums on Various Subjects and Visits to Plants Will Occupy Time of Members During Four-Day Convention.

The American Electrochemical Society has arranged a long program for the benefit of its members who will attend the annual meeting of the society, to be held in Boston, April 7-10. On Wednesday evening, April 7, there will be a meeting of the board of directors, followed on Thursday morning, April 8, by the annual business meeting of the society, at which time there will be an address by Wilder D. Bancroft, the retiring president, on "Contact Catalysis." This will be followed by a symposium on "Colloid-chemistry" in connection with which ten papers will be read and discussed.

On Friday morning the society will hold a joint meeting with the American Institute of Electrical Engineers, presided over by Mr. Bancroft, at which there will be a symposium on "Electrically Produced Alloys," with papers as follows: H. E. Howe, "Fundamental Problems in Alloys Research"; R. J. Anderson, "Recent Developments in the Ferro Alloy Industry"; C. B. Gibson, "The Manufacture of Ferro Alloys in the Electric Furnace"; B. D. Saklatwalla, "Ferro Vanadium"; Elwood Haynes, "Stellite"; F. A. Raven, "Properties of Ferro Silicon"; E. S. Bardwell, "Ferro Manganese"; R. C. McKenna, "The Manufacture of High-Speed Steel in the Electric Furnace"; Alcan Hirsch, "Ferro Cerium"; Theodore Swann, "Ferro Zirconium"; B. G. Klugh, "Ferro Phosphorus"; R. M. Major, "Nichrome and Other Special Alloys"; T. D. Yensen, "Electric Properties of Nickel Iron Alloys"; M. A. Hunter, "Electrical Properties of Titanium Alloys," and C. F. Harding, "Nitrogen Fixation by the Silent Discharge."

On Friday afternoon the convention members will visit the Lynn (Mass.) plant of the General Electric Co. and at 6:30 p. m. will attend an informal subscription dinner at the Copley Plaza Hotel.

A symposium on "Power for Electrochemical Industries" will be presented at the Friday evening session, presided over by Calvert Townley, president of the American Institute of Electrical Engineers. The following papers will be read and discussed: John L. Harper, "Power for Electrochemical Plants"; John A. Seede, "Automatic Control of Arc Furnace Electrodes"; H. A. Winne, "Reactors for Electric Furnace Circuits"; C. A. Winder, "Economies of the Power Situation"; E. A. Wilcox, "Electric Furnace Power from the Standpoint of the Central Station"; H. L. Hess, "The Electric Furnace and the Central Station"; C. T. Maynard, "Location of a New England Electrochemical Plant"; F. F. Fowler, "Water Powers of the Pacific Coast"; J. W. Beckman, "Power Development in Scandinavia," and W. G. Berlin, "Power Problems from the Standpoint of the Furnace Operator."

Saturday morning there will be a session at Harvard University at which the following papers will be read: J. W. Richards, "The Soderberg Self-Baking Continuous Electrode"; Charles A. Jeller, "Synthetic Electric Furnace Pig Iron"; Philip B. Short, "Step Induction Regulators for Electric Furnaces"; Clarence J. West, "The Electric Furnace as Applied to Metallurgy"; H. M. St. John, "The Electric Brass Furnace—Its Evolution"; L. B. Lindemuth, "The Electric Furnace in Iron and Steel Metallurgy," and Edward F. Kern, "The Reduction of Manganiferous Silicate Slags."

A visit to the Huff Electrostatic Separator Co. Saturday afternoon will close the convention.

SUPPLY MANUFACTURERS HOLD ANNUAL MEETING.

Committee Reports at New York Meeting of Associated Manufacturers of Electrical Supplies Show Increasing Accomplishments During Past Year.

The growing importance of the organization of the Associated Manufacturers of Electrical Supplies was more generally realized at the annual meeting held at the Waldorf-Astoria Hotel, New York City, on March 18 than at any other previous meeting.

At no other time in the history of American business has organized effort been as necessary as it is at present, not only for the purpose of increasing production and effecting harmonious relations between employers and employes at home, but also for creating foreign markets for American manufacturers. These problems the organization is solving now, as much for the benefit of the entire electrical industry as for the benefit of the individual members.

Although only one session was devoted to transacting the affairs of the organization, a large amount of business was handled. This was due to the fact that it was entrusted to various committees that had reports ready for the annual meeting. In addition to the reports of the various committees, reports of the officers also were read.

The first report was that of President A. W. Berresford, who called attention to the record and accomplishments during the past year, stating that that record is attributable to the enthusiasm of the members. He complimented the board of governors for the diligent service that it had rendered and for the assistance that it

had given to the officers. He also called attention to the fact that, during his incumbency as president, he had become more strongly impressed with the importance and necessity of the organization than he had ever become previously.

J. F. Kerlin,
Newly Elected President of Associated Manufacturers of Electrical Supplies.

Co-ordinated effort eliminates confusion in industry. Nothing pays larger dividends than co-operation. The accomplishments of the past give some idea of what those of the future will be.

The report of Secretary Charles E. Dustin, which was his fifth annual report as secretary, was presented informally. He alluded to the General Standards Committee, which was one of the most important matters considered during the past year. He stated that, at the next meeting much interesting information about the work of this committee will be presented. During the past year the membership was increased by 16 new members and three associates, so that the membership now stands at 194 members and 192 associate representatives.

The treasurer's report, which was combined with that of the Finance Committee, was read by R. E. Gallaher, because of the illness of Chairman Charles Blizard. The association was shown to be in a prosperous condition.

Judge Thomas M. Debevois, counsel for the association, presented no formal report but made a few remarks about the policies and activities of the association and of the different sections. He spoke of the advantages to be gained by an organization like the association and mentioned some of the commercial activities in which it can indulge advantageously. He referred to the desirability of maintaining high business standards and complimented the association upon the activities in which it has indulged.

The report of the International Trade Committee, of which John J. Gibson is chairman, reviewed the activities of the committee in connection with matters of commerce and tariff. The committee has been working in co-operation with the United States Tariff Commission in the collection of commercial statistics for the government. At the end of the report, a resolution was passed authorizing this committee to decide on the nature of its own activities and to use its discretion in co-operating with other organizations.

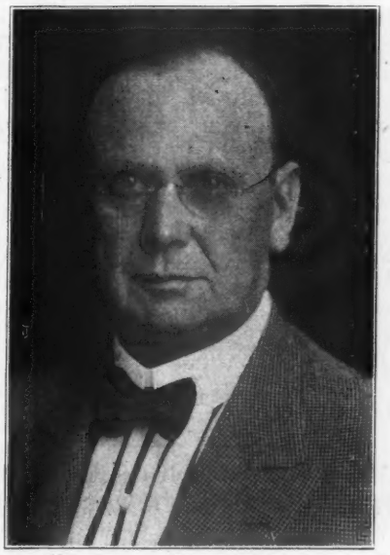
In the reports of other committees it was shown to be desirable for suggested changes of the National Electrical Safety Code, so that they can be acted upon soon.

The report of the delegation to the Electrical Manufacturers' Council, the objects of which are to recommend policies, to co-ordinate work, to furnish a clearing house for suggestions, to afford facilities for conferences, and to exercise functions authorized was presented. The membership is limited to four representatives from each member organization. Because of the increasing activities of the Council, the appointment of a permanent, full-time secretary has been effected.

A resolution was passed directing that the annual meeting be changed from the third Thursday to the third Tuesday in March. The change of date was thought advisable to facilitate attendance and other matters. A fitting memorial resolution was passed on the death of Robert K. Sheppard, to whose foresight, enthusiasm and energy the organization of the association was largely due.

At the close of the afternoon session a representative of the League for Industrial Rights presented the aims of that organization. Several members of the Association already are members of the League and others are considering the advisability of joining it.

The program for dinner party in the evening included addresses by Dr. W. R. Whitney, director of the research laboratories of the General Electric Co.; Hon. Edward James Cattell;

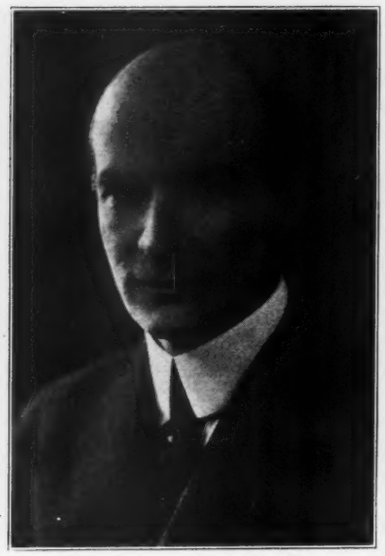


J. W. Perry,
Re-elected Treasurer of Associated Manufacturers of Electrical Supplies.

F. R. G. Gordon, National Electric Light Association, and others.

Dr. Whitney presented the case of the man of science as being anything but desirable. As a general thing he is a modest individual, contented with small personal recompense, infatuated with his subject, and anything but a business man. He is usually found in a small laboratory with modest surroundings. He is not appre-

New Members of the Board of Governors, A. M. of E. S.



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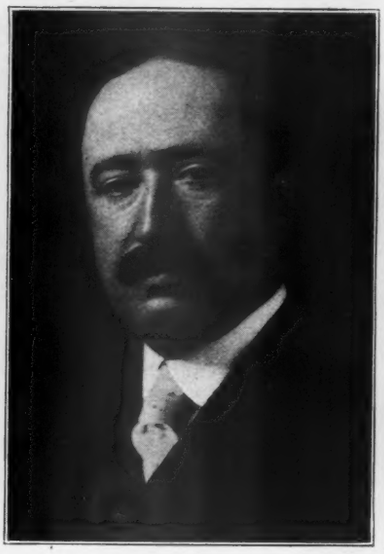


W. H. Thornley.

H. D. Hawks.

ciated during his time and he is never supported adequately. And yet, the entire industrial development of the world depends upon his self-denial and painstaking and assiduous study.

Mr. Gordon, who spoke on vital questions of the day, compared the financial situation of public utilities in countries in which state ownership exists with the situation of privately owned utilities in this country. According to statistics presented, the financial situation of the state-owned utilities is inferior to that of utilities that are privately owned. The government railways of Germany, Belgium, France and Britain are capitalized nearly double as much per mile as the private owned railways in the United States.

Officers elected for the ensuing year are: President, J. F. Kerlin, Corliss Carbon Co.; vice-president, Le Roy Clark, Safety Insulated Wire & Cable Co.; treasurer, J. W. Perry, H. W. Johns-Manville Co.; secretary, Charles E. Dustin. New members of the board of governors elected to serve three years are: W. F. Field, Phillips Wire Co.; H. D. Hawks, Anaconda Copper Co.; Shiras Morris, Hart & Hegeman Mfg. Co.; W. H. Thornley, Tubular Woven Fabric Co., and J. H. Trumbull, Trumbull Electric Manufacturing Co.

LARGE ATTENDANCE AT CONVENTION OF WISCONSIN ASSOCIATION.

More Than 100 Members Attend Milwaukee Sessions and Discuss Papers Read by Men in Electrical Industry.

The urgent need of placing electrical public utilities company in the right light before the general public was strongly stressed in two addresses made on the opening day of the two-day annual convention of the Wisconsin Electrical Association, held at the Hotel Pfister, Milwaukee, March 24 and 25. More than 100 members of the association attended the sessions while at the annual banquet held at the Milwaukee Athletic Club, Wednesday evening, under the joint auspices of the Wisconsin Electric Association and Wisconsin Gas Association close to 300 persons were present.

Addresses urging that the public be properly educated as to the utility situation were made by M. H. Aylesworth, executive manager of the National Electric Light Association, and B. J. Mullaney, director of the Illinois Committee on Public Utility Information, Chicago.

Mr. Aylesworth, fresh from a swing around the southwestern states, where he had been outlining the new Geographical Section plans of the national association, did not touch on this subject at the Milwaukee meeting, leaving that for a later meeting. In opening his address on "The Relations of the Central Station to the Public," Mr. Aylesworth said:

"Looking back 10 or 20 years we find the electrical industry has grown so fast we are astounded, but when we reflect we find that the industry is still in its infancy. The time has arrived when we can, and must, intelligently inform the public as to what we want, what we need in the way of rates and support, and when the public is so properly informed we can get what we need. When the dollar of 1914 became the half dollar of 1920 the public was dumbfounded when public utility companies commenced to ask for small raises in rates. They could not understand why it should cost more to furnish electrical energy.

"This means that something is wrong and shows that the public is not educated in the utility field as to its necessities. The different state public utilities commissions, in a way, stand between the company and the public, but the commissions cannot educate the public. The duty of the commissions is to fix rates and arbitrate differences, to act as umpire, as it were, but the question of educating the public is not within their province.

"The duty is squarely up to the central station companies and we must lay our hands right on

the table. We have not gone far enough in taking the public into our confidence. In this connection I am reminded of the story told by a central-station man who said the public had never been educated beyond the letter "B" in the electrical alphabet. They knew "bill," "bulb," "button" and there the education ended. It should go farther, at least to the letter "S," so the public would be educated in "service" and "satisfaction," with the ultimate results that this would spell "success" for all parties concerned.

"There is a greater power shortage in the United States today than during the war period. Congress has just passed a new water-power law, and power that is available under this law will be developed at once, but to do this the electrical industry must get money. It is electricity and the electrical industry that must be the leading factors in speeding up the work and production of this country.

"It is hard for public utility companies to get the necessary financial aid at this time and therefore there is all the more need of properly educating the public so that the small investor, served by the company in his community, will realize the value of it and be ready and willing to subscribe to its stock.

"When the recent 14% increase was granted coal miners it was given out by the Bituminous Coal Commission and by President Wilson that the mine operators would absorb this increase and not pass it on to the public. But there was a hitch, in that the operators declared that the absorbing of the 14% increase by themselves did not apply to contract coal. Now 85% of all coal mined is contracted for, and 98% of all coal used by public utility companies is contract coal, so the 14% increase was passed onto the utility. But the public did not know this until a committee from the National Electric Light Association visited Washington and forced the facts into the public prints and thus to the knowledge of the consumers of electric energy. This is just one instance of where the utility companies would be blamed by the customers for something that was entirely beyond their power to control.

"It is also something that municipal or state authorities could not possibly have any control over. While the public and public authorities have not entirely been satisfied with state regulation, I am personally of the opinion that it is a success, and feel that most state commissions should be congratulated on the intelligent manner in which they have attempted to handle the complexities of public utility regulation throughout the trying period of the war.

"Guns have been laid down and cannons have ceased to roar, but the conditions facing us today are more complex than ever. Costs are not decreasing; labor conditions are unsettled and the entire country seems to be on an after-the-war spree. This cannot continue without throwing the nation into bankruptcy and resulting in the hunger and suffering of the masses.

"Neither capital nor labor may organize to the extent of demanding that which is unfair, for in the end the unorganized public which fortunately can organize on one day at least—election day—will cast an avalanche of ballots which will wipe out the greed of any organization and set back for half a century its legitimate development, which must necessarily accompany the illegitimate force which has been restricted by an indignant public. The so-called labor class may threaten demand and strike, but its success will be measured only by sympathetic public opinion and this is true as well of the profiteer in illegitimate business enterprise.

"In this government of ours public opinion eventually controls and we may curse and rave and grow long hair and carry bombs, but the substantial common people who are sometimes slow to act but always arise in a crisis, will continue to wield out justice."

Urges Formation of Publicity Bureau.

Mr. Mullaney's address took the place of one scheduled to be delivered by M. E. Sampsell, president of the Wisconsin Power, Light & Heat Co., who was unable to attend the convention. The address was delivered at a joint session of the electrical and gas associations, immediately preceding the opening of the electrical association convention.

Mr. Mullaney described in detail the formation of the Illinois Committee on Public Utility Information about a year ago and urged the organization of a similar committee in Wisconsin. He said in part: "Public utility companies are not in a happy position. Rates have not kept pace with costs and financial obligations are hard to meet. These conditions have simply thrown into high relief and aggravated conditions that have been bothersome for years. Public opinion against utility companies is generally raised through the efforts of demagogues and this sort of work is the hardest to combat.

"State utility commissions are doing good work, but they are themselves of the public. We can talk until we are black in the face about commissions not having backbone, but it can be traced right to the fact that in the long run any question concerning a public utility always gets back to the public which holds the lives of the utility commissions in their hands and through the commissions the companies are held.

"All utility companies must stand well in the community they serve. If one company is in bad odor it reflects on all other companies in that neighborhood. It is up to the companies to ease the pressure of adverse public opinion by education. All unfriendly feeling toward public utility companies is the result of ignorance. Boards of directors of utility companies, executives and even stockholders have been talking about this very thing for the past 25 years, but have been doing nothing. It is the job of the public utility companies to educate the public and one of the best methods of doing it, the Illinois Committee on Public Utility Information believes, is the method it is following—that of furnishing ipmartial, unbiased news of the utility companies to the newspapers of the state."

At the opening of the joint session William C. Knoelk, executive secretary of the Community Service of Milwaukee, spoke on "The Leisure-Time Factor," in which he urged the necessity of proper co-operation between employer and employe both during the time the employe was in the factory and outside.

At the Thursday sessions papers were read by Paul Stark, general auditor of the Eastern Wis-

consin Electric Co., on "Cost of Production Less Depreciation"; by E. M. Walker, general manager, Terre Haute, Indianapolis & Eastern Traction Co., Terre Haute, Ind., on "Possibilities in City Street Car Operation," and by C. A. Butcher, of the Westinghouse Electric & Manufacturing Co., on "The Development of Automatic Substation Equipment." A report of a special committee on "Rural Line Extensions" was also read by G. C. Neff, general superintendent of the Wisconsin Power & Light Co., Madison, Wis. A full report on these papers will be given in next week's issue of the ELECTRICAL REVIEW.

At the banquet Wednesday evening Edward J. Dempsey of Oshkosh, Wis., presided as toastmaster, while short talks were made by Mr. Aylesworth, Mr. Walker, Paul Jackson, chairman of the Wisconsin Railroad Commission, and James McGillian, Green Bay.

MANY SIDE TRIPS PLANNED ON JOBBERS' COAST TRIP.

Beside arranging for a special train from Chicago to Del Monte, Cal., to carry members to the twelfth annual convention of the Electrical Supply Jobbers' Association, May 12-14, the transportation committee of the association has also arranged numerous side trips in connection with the trip. The special train will leave Chicago over the Chicago & Northwestern railway at 6:10 p. m. on May 7 and arrive at Del Monte, May 10. The side trips arranged include all of the beauty spots in California and at other places on and near the Pacific coast. Full information as to the special train and side trips can be obtained by writing Franklin Overbagh, chairman Transportation Committee, 411 South Clinton street, Chicago, Ill.

WESTERN ELECTRIC CO. EARNINGS IN 1919 TOTALLED $5,652,089.

Sales Show Slight Decrease Due to Falling Off in United States Government Orders—Total Orders Were $135,722,000.

Despite a falling off in sales to the United States Government during 1919 of almost $16,000,000, the Western Electric Co. came within $9,500,000 of doing as much total business as in 1918, according to the annual report of Pres. Charles G. Dubois to the stockholders, made public, March 23.

The total sales of the company for 1919 were $135,722,000, divided as follows: To Associated Bell Telephone companies, $69,982,000; to United States government, $5,991,000, and to other customers, $59,749,000. The total sales in 1918, when the government business amounted to $21,285,000, was $145,226,000.

From this showing it is seen that the decrease in 1919 total business is entirely due to lessened government requirement. Excluding government business the company had an increase of $6,330,000 in total sales.

The net earnings of the company after providing for depreciation of plant and merchandise and after providing for all taxes amounted to $5,652,089. The earnings were 6.9% on the average investment for the year, which was $81,400,000.

The total number of employes of the company Dec. 31, 1919, was 27,584, as compared with 26,126 at the same time the preceding year.

On Dec. 28, 1919, the company celebrated the fiftieth anniversary of its founding, the laying of a cornerstone at the Hawthorne plant being one of the events of the celebration. As a memorial to the 41 employes of the company who lost their lives in the world war, the company is erecting an athletic field at the Hawthorne plant, the estimated cost of which, exclusive of the land, is $82,000.

GREATER PRODUCTION URGED AT NEW YORK MEETING.

At the monthly luncheon of the New York Electrical League, held at the Hotel McAlpin, New York City, March 17, Frank A. Vanderlip, former president of the National City Bank and a recognized authority on economic matters, gave an address on "What Does America Need?" He said that this country was suffering from a lack of capital and lack of labor for productive purposes. The lack of capital he attributed chiefly to the inflation of bank credits, coupled with the reckless extravagance in spending that one sees on every hand. To rectify this condition, Mr. Vanderlip urged intelligent thrift. He explained that by thrift he did not mean hoarding but that real thrift meant the saving of some money out of every income for investment in productive enterprises. In this way, and in this way alone, can this country increase production and return to a sound economic basis.

On the subject of labor, Mr. Vanderlip recognized the present unrest as a more or less natural consequence of the war. He stated that prices have advanced 148% since 1914 and that this increase has meant prosperity for some and hardship and privation for others, notably the salaried and professional class.

As a remedy, Mr. Vanderlip urged greater production, which must be brought about by a better understanding between capital and labor. He said that production was a question of spirit; that capital and labor must approach each other, not as antagonists, but as friends, working together to solve a mutual problem.

NEW STOCK OFFER ADDS $15,000,000 TO GENERAL ELECTRIC CAPITAL.

Stockholders Approve Increase in Stock of Company From $125,000,000 to $175,000,000 to Provide for Expansions in Business.

The new stock offer authorized by the directors of the General Electric Co. will increase the present outstanding capitalization of $123,050,000 by about $15,380,000, making the total stock outstanding after May 20, when the subscription period expires, approximately $138,430,000. Stockholders' subscription rights to the new stock are worth about $3.65 a share at the present market price of $165.

At the special stockholders' meeting held in Schenectady, N. Y., March 16, the proposed increase in the authorized capital stock from $125,-

000,000 to $175,000,000 was approved. After the new offer there will be over $36,000,000 stock unissued, which will take care of the regular 4% stock dividend for about six years.

The purpose of the new issue is to enable the company to provide equipment necessary for its greatly increased business. Incoming orders have been running close to the $300,000,000 rate since the first of the year, and the permanent character of the building program now under way intimates that the company does not look for any abatement.

It was said recently that additions and improvements either under construction or planned by the General Electric Co. would involve a total expenditure of almost $25,000,000. The policy of leasing plants or buildings already constructed, however, has proved an economical one, so that the immediate cash needs of the company are undoubtedly well within the amount provided by the new stock offer. An example of the economy of this practice can be seen in the case of the Remington plant at Bridgeport, Conn., which the General Electric Co. has leased with the option of purchasing. It is said that construction of this plant today would cost close to $15,000,000. Leasing the big plant, however, obviates the necessity of such huge expenditure and at the same time enables the company to meet the requirements of its business.

U. S. LAUNCHES FOURTH ELECTRIC BATTLESHIP.

The super-dreadnaught *Maryland,* the fourth battleship of the U. S. Navy to be equipped for electric drive, was launched at Newport News, Va., on March 20. The *Maryland* is sister ship to the U. S. S. *California,* launched in November at the Mare Island Navy Yard, California.

The electrical propulsion equipment of the *Maryland* consists of two General Electric turbo-generator units rated at 11,000 kw. each., one control board, four 7000-hp. propeller motors of the induction type and six 300-kw. exciter sets. The capacity of the complete power plant for propulsion is 28,000 hp. In most respects the electrical equipment of the *Maryland* is similar to that of her predecessors, the *California* and *New Mexico.*

From a naval standpoint she is the first vessel to mount 16-in. guns, being supplied with a battery of eight, thus possessing a range greater than any other American warship. She is 624 ft. long, displaces 32,000 tons and is equipped to operate at full speed up to 21.5 knots per hour.

CONFERENCE CLUB MEMBERS CONFER ON REORGANIZATION PLANS.

Members of the Conference Club met at Hotel Cleveland, Cleveland, O., March 18, to consider the time and place of the next meeting, the selection and election of new members, and the appointment of a committee on constitution and by-laws for the reorganized club. It was decided to defer appointment of the latter committee until new members representative of the various branches of the industry have been secured, thus permitting a more general participation in the shaping of the future affairs of the club. The chairman was empowered to name the committee at the proper time. Action was taken directing that a committee composed of Chairman L. K. Comstock, Secretary Sullivan W. Jones and W. C. Peet, attend the convention of electrical jobbers at Del Monte, Calif., and that of the National Electric Light Association at Pasadena, Calif., preliminary to the maturing of the reorganization plans of the club.

It was tentatively decided to hold the next convention of the Conference Club at White Sulphur Springs, W. Va., some time between June 10 and July 10, the definite date to be announced later.

Among those present at the meeting were L. K. Comstock, G. E. Stewart, W. J. Bickford, J. G. Livingstone, G. M. Sanborn, T. B. Hatfield, E. J. Ellis, W. C. Peet, J. A. Cole, R. M. Walker, B. H. Bendheim, F. A. Mott, L. F. Brooker, D. R. G. Palmer, F. C. Werk and Sullivan W. Jones.

ACTIVITIES OF THE SEATTLE SECTION, A. I. E. E.

The feature of the last meeting of the Seattle (Wash.) Section, American Institute of Engineers, held March 16, was an address on "Some Elements for Consideration in Public Utility Valuations," by Thomas E. Phipps, formerly chief engineer of the Public Service Commission of Washington.

The Seattle Section, of which G. E. Quinan, chief engineer of the Puget Sound Traction, Light & Power Co., is chairman, and W. T. Batcheller, of the Seattle Lighting Department, is secretary, now has its activities limited to the territory within a radius of 60 miles of Seattle. The executive committee has been authorized to confer with the national organization a proposal to extend the territory of the section to include that half way to Spokane and half way to Portland. A membership campaign is under way to increase the present membership of 120.

At the April meetings papers will be presented on the pipe line and on power-house design at Cedar Falls and on the new type of distribution system in Seattle. Members of the section will visit, on May 1, the city's hydroelectric station and the substation of the Chicago, Milwaukee & St. Paul Railway at Cedar Falls.

A. I. E. E. MAKES NOMINATIONS FOR OFFICERS.

At the meeting of the board of directors of the American Institute of Electrical Engineers, held in Pittsburgh, March 12, the report of the committee of tellers of its canvass of the nomination ballots cast for candidates for the Institute offices falling vacant July 31, 1920, was presented. As required by the constitution of the Institute, the board then selected by ballot its list of "directors' nominees," with the following result: For president, A. W. Berresford, Milwaukee; for vice-presidents, C. S. Ruffner, New York City; E. H. Martindale, Cleveland; Charles Robbins, Pittsburgh; C. E. Magnusson, Seattle; C. S. McDowell, U. S. Navy, and L. T. Robinson, Schenectady, N. Y.; for managers, E. B. Craft, New York City; Harold B. Swift, Worcester, Mass., and James F. Lincoln, Cleveland; for treasurer, G. A. Hamilton, Elizabeth, N. J.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

RURAL ELECTRIC SERVICE AFFECTED BY "HOME RULE."

Middle West Communities Develop Desire for Local Control of Public Utilities, Is Report of Farmers' Publications.

"While the federal government has become increasingly centralized during the war period, there has developed in the Middle West rather sinister agitation for 'home rule' by municipalities over their public utiltes," says the *Rosenbaum Review*, a farmers' publication having wide circulation in Illinois and Middle Western states, in a recent issue.

"Local politicians crave more power for good or evil. Public utility experts foresee much evil in the home rule campaign unless farmers and bankers awaken to its full significance. Its head has bobbed up several times in the Illinois Constitutional Convention at Springfield.

"Farmers and bankers are the people who should be most concerned, but they do not appear to realize it. City populations have their public utilities, which cannot get away, whereas rural sections are just beginning to get theirs, and future development and prosperity of farming communities depend largely upon the amount and character of public utility service they shall secure. Good roads and motor vehicles will provide some local transportation, perhaps but farming efficiency demands electric power and interurban street cars.

"Public utilities cannot be attracted to projects of expansion and intensive development if they have to serve many masters, such as home rule implies. One company in the state, for instance, would have to obey 113 sets of rules imposed by as many local governments under home rule.

"Bankers are even more concerned than public utility people because they have floated most public utility securities and thereby assumed direct responsibility. Public utilities have been successfully placing their securities with customers, but to make customer ownership successful they must operate profitably."

"ELECTRICITY, THE BURDEN BEARER," INTERESTING BOOKLET.

Illinois Committee on Public Utility Information Issues Booklet, Written by William E. Keily, That Tells History of Electricity.

The Illinois Committee on Public Utility Information has issued a 40-page illustrated booklet, written by William A. Keily, and entitled "Electricity, the Burden Bearer," that should be of interest to all persons, whether they are actively connected with the electrical industry or not.

The booklet is really a history of electricity and its development as a public utility, and is written in a style that will appeal to all readers, as purely technical terms have been avoided.

Taking up the earliest discoveries in electricity, such as the kite experiments of Benjamin Franklin in 1752 and later years, and the later discoveries of Galvani and Volta, Mr. Keily then traces the development of electricity through the nineteenth century, telling in graphic form the invention of the telegraph, the dynamoelectric machine and the more modern electrical apparatus. In this connection Mr. Keily says, "It was only during the nineteenth century that electricity was really put to work and, indeed, only in the last quarter of the last century that it was put hard at work."

The booklet tells that street arc lighting was first effected in Cleveland in April, 1879. Thomas A. Edison is given credit for evolving the central-station idea, the first station being established at his Menlo Park (N. J.) laboratory in 1880, while the first one commercially used was established by the Edison Electric Illuminating Co. and placed in operation at its Pearl street, New York City, plant on Sept. 4, 1882. The first commercial distribution system using alternating current was effected at Great Barrington, Mass., in 1885, and the first alternating current plant in the United States was that established by the Westinghouse company at Greensburg, Pa., in 1886.

Mr. Keily also tells in detail the advances in the electrical industry that made possible the wonderful strides in the last 30 to 40 years of the telephone and the electric railway.

N. E. L. A. GEOGRAPHIC SECTIONS PLAN MEETS APPROVAL.

That the general program of organizing geographic sections within the National Electric Light Association is meeting approval is evidenced by action taken at recent meetings of several state and district associations. M. H. Aylesworth, executive manager of the association, made addresses at these meetings urging the geographic section plan, with the result that three organizations have given expressions favoring closer affiliation with the national organization.

The following telegrams sent to President R. H. Ballard, of the national association, following the visits of Mr. Aylesworth to the different meetings show how favorably the geographic sections plan is being received:

From T. A. Lane, president of the Oklahoma Utilities Association: "Electric Light Division of Oklahoma Utilities Association heartily endorsed by resoluton in convention that it affiliate with National Electric Light Association."

From H. S. Cooper, secretary of the Southwestern Electric and Gas Association: "Ayles-

worth's talk on national association made so strong and favorable an impression on the Oklahoma association as well as on myself as representative of the Southwestern association that I would urge as a necessity to both the National and Southwestern associations that he present it before our May convention in Galveston."

From R. B. Schlaggett, president of the Mississippi Electrical Association: "I was present at address given by Aylesworth before Oklahoma convention and was delighted with reorganization plans and am going to strongly urge Mississippi Section to remain affiliated with the National association."

In a telegram to Mr. Ballard, Mr. Aylesworth reports that Oklahoma, Texas and Mississippi are in line with the reorganization plans of the N. E. L. A. and strongly approve of the geographic section idea.

COMMONWEALTH EDISON CO. "OLD-TIMERS" HOLD REUNION.

About 300 employes of the Commonwealth Edison Co., Chicago, with from 15 to 30 years or more of service with the company to their credit, held their first "old-timers" annual reunion and smoker at the Hamilton Club, Chicago, on Friday evening, March 19. C. G. Y. King, constructing engineer of power stations, who has been continuously in the employ of the company for more than 30 years, featured the program with an illustrated talk of his recent tour of the French battlefields.

CONTRACTORS AND CENTRAL STATION IN WIRING CAMPAIGN.

Plans have been completed for an extensive house-wiring campaign in New York City by the United Electric Light & Power Co. working in conjunction with electrical contractors of that city.

The central-station company has prepared advertising matter to reach the public, the principal feature of which will be a series of advertisements in the daily newspapers and which will comprise 27 pieces of individual copy. The accompanying illustration shows three of the advertisements.

Financing the house wiring improvements will be done by the United company through the local electrical contractors, the former co-operating with them in order to make the campaign a success. Present indications point to a hearty co-operation between the central-station company and the contractors, and it is expected that a few house-wiring records will be broken.

EDUCATIONAL COURSES GIVEN BY CALIFORNIA COMPANY.

Approximately 300 employes of the Southern California Edison Co. are now enrolled in the educational courses arranged by the Commercial and Accounting Sections of the National Electric Light Association and which cover the subjects of practical electricity, commercial engineering, elementary accounting and advanced accounting. In the enrollment 280 of the 300 are listed in the practical electricity course.

The courses, which are designed as correspondence courses, and which can successfully be carried on as such with a great deal of benefit to the student, are being supplemented by the Southern California Edison Co. with meetings in the different districts in which the company operates. At these meetings demonstrations of the principles and theories covered by the instruction book are performed and where necessary such theories are elaborated upon. Following this a general discussion is held, which offers the students an opportunity to ask questions regarding principles that have not been made sufficiently clear by the instructions given.

In the promotion of this work it was found advantageous and effective to invite all of the employes in a district to the first meeting in order that they might obtain a better idea of the purpose and worth of the course.

There was a time
when candles were considered the standard for light. But that time is past. There is only one standard now—electric light.
for you—housewiring on partial payments! Phone Stuyvesant 4080 or write for details of how we will finance such improvements through your local electrical contractor.
The United Electric Light and Power Co.
130 East 15th St.
Sherman Creek Generating Station
West 201st Street and Harlem River
District Offices and Show Rooms
80th Street and Broadway
146th Street and Broadway
There was a time
when old buildings couldn't compete for tenants with newer ones. Improved with electric service, it's a simple matter for them to hold their own.
for you—housewiring on partial payments! Phone Stuyvesant 4080 or write for details of how we will finance such improvements through your local electrical contractor.
The United Electric Light and Power Co.
130 East 15th St.
Sherman Creek Generating Station
West 201st Street and Harlem River
District Offices and Show Rooms
80th Street and Broadway
146th Street and Broadway
There was a time
when even simple cookery meant stove slavery. Electric table appliances are a modern convenience and delight that is possible only in wired homes.
for you—housewiring on partial payments! Phone Stuyvesant 4080 or write for details of how we will finance such improvements through your local electrical contractor.
The United Electric Light and Power Co.
130 East 15th St.
Sherman Creek Generating Station
West 201st Street and Harlem River
District Offices and Show Rooms
80th Street and Broadway
146th Street and Broadway

Three of a Series of Advertisements to Be Used in New York House-Wiring Campaign.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

HOW THE CONTRACTOR-DEALER CAN MAKE HIMSELF KNOWN.

When the People in Your Community Think of Electrical Work, They Should Naturally Think of You.

At the present time the general public is being told and re-told about the convenience and uses of numerous electrical appliances, such as the flatiron, toaster, percolator, grill, washing machine, vacuum cleaner and other portable motor-driven devices used in the home. In fact, it is now apparent that through the money being spent by manufacturers in advertising, such a demand will be created as to easily absorb the outputs of many of the electrical manufacturers and that most of them will have difficulty in keeping up with the demand.

With all this equipment going into the homes, the simple wiring system of yesterday with its one or two branch circuits and a minimum of ceiling and switch outlets will not suffice. The contractor will now be called upon to put in a real wiring job with numerous and adequate circuits, outlets, receptacles, switches, etc. And he will also—or at least can—handle and sell a big part of the equipment and appliances for the electrical home of today. The possibilities for the contractor entering the dealer field perhaps never were better than they are at the present time.

Will the contractor take advantage of this condition—a condition never before existing with possibilities of such proportions as to be impossble for the most optimistic optimist to overestimate?

There is a simple method of routing this growing business through your (the contractor-dealer's) establishment. Set about it at once to make your business known in your community, so that when anything pertaining to electrical work comes up your name is at once thought of, or at least is one of a few that is considered. Various methods will be discussed later in detail but, generally speaking, adopt some distinct policy—advertise in various ways regularly even if not so frequently; talk electricity to everyone; make your advice of value; make it apparent that you are not a *small* business man, but substantial and sincerely in earnest about your confidence in your own business. As a matter of fact there is no business that is being pushed as the electrical business is today.

Don't let local newspaper solicitors come in and lure you into running a hasty advertisement every time they catch you. Surprise one of them—yes, even take a chance on shocking or stunning him some day—by announcing that you are going to map out a series of a dozen adver-

This Double-Page Spread Shows How Cleveland Contractor-Dealers Are Making Themselves Known to the Public.

tisements to appear once or twice a week in spring and another series in the fall. Ask some of the manufacturers whose lines you handle to suggest some advertisements for you.

ADVERTISING THE BEST WAY OF GETTING LOCAL PUBLICITY.

The advertising departments of several manufacturers prepare advertisements that are written and illustrated from the contractor-dealer's viewpoint, even to the exclusion, sometimes, of their own products. The mention of appliances that are nationally advertised helps your advertisements.

If you belong to any organization you can, without overstepping the bounds of etiquette, gradually establish yourself as *the* electrical man.

If you are doing something of particular interest in the way of wiring in a residence or factory, tell others, by means of letters, of the work you are doing. Mrs. Jones, who may be planning a house, will be interested in knowing that Mrs. Smith has four receptacles in her living room installed by you and which will allow Mrs. Smith to change about the arrangement of the furniture, floor lamps and portable lamps to produce any number of charming settings. An item of that kind would also be interesting if told in an advertisement.

Keep steadily at this—eliminate needless expenditures for novelties, "one-time" advertisements, etc. As the business of equipping more and more homes, offices and buildings increases, you will be getting an increased share of it. *Your* name will be thought of when the subject of electric matters is discussed.

Relation of Selling Expense and Discounts to Net Profits in Retailing Electrical Appliances

Dollars and Cents Net Profit, Not Volume of Business, Is Proof of Success of the Dealer, Says A. L. McCarthy of the Eureka Vacuum Cleaner Co.

The net profits earned by a business are dependent upon four distinct factors—the buying price of merchandise, the selling price, the volume of business, and the expense incurred in operating the business. It may seem a waste of time—yours to read and ours to write—to enumerate them, yet we must frankly admit that we are prone to believe that the average dealer of electrical appliances is of the opinion that only one of these factors has any relation to his net profits. This one is the volume of business done either in the number of appliances sold or the business done in dollars and cents.

One hears how many washing machines, flatirons, vacuum cleaners and stoves were sold this month or that year, but mention is never made whether 5 or 25% net profit was made while doing the business. One reads of 1000 cleaners sold here this month and 500 washing machines sold there last month, but profits, net profits, are what count. To sell 1000 cleaners is interesting in itself, yet to tie up $30,000 in accounts receivable and make only 5% net profit on the total volume of business is anything but interesting. We would much rather do one-half the business and make a net profit of 10% on the gross sales, or one-third the business and earn 15% net on the volume.

It is not the volume of business done that gets a dealer credit at the bank, but the dollars and cents net profit he can make his business earn.

The "cost of doing business," the margin of profit in dollars and cents realized by the retail dealer in his sale of an appliance, together with the volume of business done, are the three factors that determine the amount of the net profit that will be earned.

Net Profits

The retail dealer is in business for one particular reason—to make money. He is not so much interested in seeing his name in gold letters over a downtown store window, his name in newspaper copy or his recognition as a business man as he is in checking up at the end of the month or the year and seeing a real net profit to add to his net worth.

To merely add to his net worth on paper is one thing, but to take part of his net profits for the month or year out of his business is decidedly more interesting.

Profits on paper are good. But money in the hand looks real—is real.

Experience with electrical stores, together with knowledge of the general appliance business, has shown that a retail dealer sustains an expense in operating his business of 21 to 27% of his total sales. In other words, to do a retail business of $100,000 a year in electric appliances will necessitate the expenditure of approximately $25,000, covering salaries, commissions, advertising, freight, office, delivery and other expenses.

Using 25% as a basis for the cost of operation, some interesting data as regards net profits in their relation to discounts can be had by taking a concrete example.

Assume that two appliances (one sold as easily as the other) bore list or user prices of $50 and $75, respectively, and were sold at retail accordingly. To bring in the point of discounts, assume the $50 article was bought in quantity or on contract at a discount of 40% off, or $30, giving the retail merchant $20 gross profit, while the $75 article was bought at a discount of one-third off, or $50, giving the dealer a gross profit of $25.

The average salesman—yes, the average department manager, too—readily assumes that because the $75 article yields a gross profit of $25 its sale should be pushed ahead of the $50 article

that yields only $20 gross profit. That they think this way is due primarily to the fact that they have forgotten that it costs 25% to conduct the business—that it costs approximately 25% to sell either.

It is to be noted that to sell the $50 article a selling expense of $12.50 would have to be deducted from the gross profit of $20, leaving the dealer a net profit of $7.50, while in the sale of the $75 article the selling expense would amount to $18.75, giving the dealer a net profit of $6.25. The analysis on this basis—which is fair to say the least—shows that the dealer earns $7.50 net on the $50 article and only $6.25 on the $75 article.

If the $50 article is desirable, readily sold, reliable merchandise, the dealer had better push the sale of it ahead of the $75 article. In so doing, he ties up less money in stock, less money in accounts receivable when sales are made on the deferred payment or charge basis. He gets 15% net on his gross sales on the $50 article and about 8% on the sales of the $75 article.

This analysis can be carried even further. It would be necessary for the retail dealer to do a business of $42,000 a year on the $75 appliance to earn in actual dollars and cents as much net profit as he realizes on a business of $25,000 on the $50 appliance. In other words, during the year he would have to sell 600 of the $75 article to earn the same net profit as realized on the sale of 500 of the $50 article.

From an investment standpoint the dealer ties up 40% more money in stock when purchasing the $75 appliance for $50 than in purchasing the $50 appliance at $30, and 33% more money in accounts receivable in the sale of the respective appliance on deferred payments. In other words, it would require 73% more money to finance a going business of the $75 appliance than on the $50 one—and yet, on the same number of sales, less money in actual dollars and cents net profit would be earned.

Therefore, if the appliances are of the same nature, designed to accomplish the same results, it is most important that the retail dealer instruct his sales force to push the $50 appliance—providing, of course, it is a satisfactory piece of merchandise not only from his own point of view but also from the consumer's.

This analysis shows that the largest volume of business in dollars and cents does not necessarily mean that correspondingly large net profits will be earned. It also shows the effect of the cost of doing business on the net profits even though the gross margin of profit in dollars and cents is larger on one appliance than on another, list prices varying also. It is very essential that the dealer ascertain what the relation is between his gross sales for the month or year and the gross expense incurred during his operation for the month or year. The difference between the gross profit and the gross selling expense will always equal the net profit whether it is figured in dollars and cents or whether it is figured in percentages.

Buy right—cut the unnecessary expenses—stop the leaks—spend money when the spending will represent a reasonable per cent of the business that will be secured—and sell right. Keep after your collections—get the money in when it is due—do not take excuses month after month. Then at the end of the month or year the net profits will not be on paper but in hard, cold cash in the bank or in increased stocks in your warehouse—and paid for.

Much to Be Gained by Good Shopkeeping Methods Shown by Success of Chicago Dealer

Possibilities in the Merchandising Field Makes Big Opportunities for the Electrical Dealer if He Pays Attention to "Keeping Shop"

Benjamin Franklin said, "Keep thy shop and thy shop will keep thee." There were no electric shops in his day, but the adage probably holds good now just as well as it did then. After all, a shop is a shop, and people buy much the same as they did in Franklin's time.

A large number of contractor-dealers are inclined to neglect the merchandising end of the business. Those who do a great deal of contracting would rather keep after wiring jobs and let the store part of their business look after itself. Selling appliances is considered incidental to the contract work—sort of a side-line to be pushed when opportunity offers and when people take the trouble to come into their store to buy.

Contrasted with these contractor-dealers is another group who think just the other way about the proposition. They realize the opportunities that exist in an electric shop; they know that the popularity and uses of electric appliances are increasing every day, that the great majority of people are just beginning to really appreciate the convenience and labor-saving qualities of the many devices now on the market. In short, they sense the market and they *do* something about it—watch their stocks, advertise and circularize their prospects, change their window displays, keep their store interiors neat and business-like, and make their service mean something to customers. They "keep their shop," they get *results*, and grow bigger and bigger every day.

The success of these real electrical merchants makes it seem reasonable that the half-hearted dealers ought to "perk up" and take advantage of the opportunities. If there's so much to be gained by good merchandising, isn't it worth trying?

There are so many "reasons why" that one simply couldn't begin to number them all. Probably the biggest is the fact that the tide is running to things electrical and that now is the time to make the most of the merchandising possibilities. All this is so evident that merchants in other lines hasten to put in stocks of appliances

Window Display of Chicago Dealer Who Has Good Storekeeping Methods.

and cash in on the demand, encroaching upon the legitimate electrical dealer's field with too much success to be pleasant. But they prove the statement that one has to be but a merchant and "keep one's shop" to make the appliance business profitable.

There is a new electric shop in Chicago—the Guaranteed Electric Appliance Co.—that demonstrates good storekeeping methods. In the short time of six months an excellent business has been built up without anything but good storekeeping. The policy is to pay strict attention to all the little details as well as the big things. Neatness and order show in the window display and store interior. Stock is fairly large and well balanced. Advertising literature, such as the blotter illustrated, are distributed in the neighborhood near the store.

It is the policy within the store that is especially commendable. It is the purpose to make good sales—the kind that stay sold and create other sales—and which are the result of the buyers' knowledge and appreciation of a device and the service given when it was sold. "Strong arm" sales work is not recognized as having a place in a store depending on pleasant relations with and confidence of customers. The following incidents will illustrate.

Not long ago a customer called for a vacuum cleaner left for repair. It was ready for him. It seems there was not as much the matter with it as was first supposed, and a very nominal

Attractive Interior of Electrical Dealer's New Store in Chicago.

charge was made. The dealer said so, the customer was pleased, and during the conversation that followed cordial personal acquaintance was established. He will be back when he needs something electrical.

The next customer was a man in search of a length of lamp cord with plug and socket attached, with which he could connect a table lamp in a corner of a room to the ceiling fixture. He evidently believed he would have to wait for one to be made up, but the proprietor showed him a good selection he had already started in anticipation of the frequent call for them. These were in lengths that ranged from 5 to 12 ft. and were in two grades, silk and cotton. Some doubt was expressed by the customer as to proper length, and he finally selected a cord 2 ft. longer than the first one picked out, at an additional

Is your Flat Iron in working order? Does your Toaster toast?
Any trouble with your Washing Machine or Vacuum Cleaner?
Have you any Electrical Appliances you cannot use because they are out of order?
If so, let us know and we will put them in first-class condition at a reasonable cost!
We convert Vases into Lamps; Alcohol Percolators into Electrical
No order too small to receive personal attention!
All work guaranteed!

GUARANTEED ELECTRIC APPLIANCE CO.

1465 E. 53rd Street Opp. Harper Theatre Phone H. P. 1178

Advertising Blotter Distributed by Dealer.

charge of 15 cents. The convenience of a two-way socket was mentioned to him and he purchased one to go with the cord.

A man and his wife were the next to enter. They had a burned-out lamp they wanted duplicated and incorrectly stated it was rated at 7 watts. A 10-watt lamp was offered, the dealer not denying it was a 7-watt lamp but explaining that the extra current consumption was negligible. The new lamp was tested and found to be all right and then the old lamp was tested. It was not burned out, much to the surprise of the couple. But they took the new one anyway and walked out with two good lamps and impressed with the dealer's honesty and service.

These little incidents, typical of the sales work of this dealer, show he was "keeping shop," and his success in six months' time shows that his "shop keeps him."

USING A TESTIMONIAL EFFECTIVELY

By I. R. Merritt.

If the writer was an electrical dealer, he would first of all secure a satisfactory testimonial from a housewife to whom he had sold at least one electrical household appliance. But he would not let the matter rest by printing it in the local newspaper as an advertisement nor would he paste the letter on the window for every passer-by to see, as so many electrical dealers do. The writer would see that the testimonial was used in an effective way, for most testimonials leave much to the imagination. The technical knowledge of electrical household appliances, which is conspicuous by its absence from so many testimonials, he would supply himself.

This is by way of introduction to the clever use of a testimonial by the New York Edison Co. The announcement follows:

EFFICIENT CLEANING.

I don't find nearly as much dust on the furniture as I did before we bought the vacuum cleaner, said a housekeeper recently. The explanation is simple. The electric vacuum cleaner collects the dirt and the resulting dust in a dustproof bag. The old broom method gathered some of the dust into little piles to be picked up on the dust-pan—the rest was scattered, in the form of dust, to be wiped away with a cloth.

The old way means two processes with great personal effort and the consumption of much time, and even then much dirt is left behind. The new electric method means one process, no difficult or exhausting human labor, and sanitary cleanliness.

BACKGROUNDS AND LIGHT IN WINDOW DISPLAY.

Design of Background, Proper Arrangement of Merchandise and Good Illumination Combine to Make Display Attractive.

It would be hard to criticize the window shown in the illustration. The general effect is one that invites more than a passing glance. Although the background is designed to please the eye, it is still so simple that it does not draw interest away from the lamps and electrical appliances grouped in the two windows.

The grouping of the articles on display also merits particular attention. On one side are various lamps of the portable type. There are not enough to confuse interest and yet the line shown is representative. On the opposite side,

Attractive Window Display of Vancouver Dealer.

appliances only are to be seen. If lamps and appliances were mixed in the display the effect would detract from the good appearance of both. The most popular electrical devices are well displayed. Overcrowding has not been allowed in the arrangement, yet there is plenty of variety. The liberal use of velvet will be noted. This invariably adds elegance to any display and takes light effects better than any other material.

Over all is the well diffused illumination of lamps in reflectors using the concealed source method. No bare lamp is exposed to the eye. Hence, in spite of the ample illumination there is no glare to detract from the general effect. The window display was made by the Old Reliable Electric Co., Vancouver, B. C.

NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

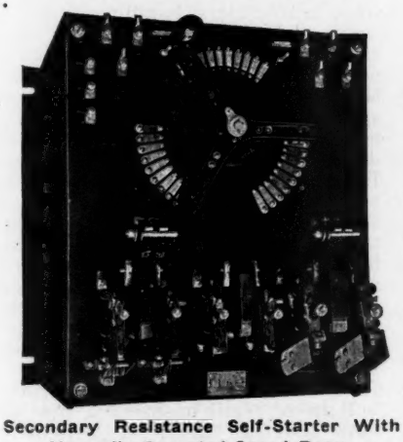
Secondary Resistance Speed Regulator and Self-Starter.

An automatic starter with a speed-regulating handle has been developed by Cutler-Hammer Manufacturing Co., Milwaukee, Wis., for use with slip-ring motors driving cylinder presses, small web presses, folders, paper-box making machines, and in similar service where a high torque is frequently required for starting and some speed changes are desired.

The starting panel consists of a primary and two secondary double-pole magnet switches, below which is mounted a rheostat consisting of the resistance segments and sliding contact arms for regulating the resistance in the secondary circuit. As the handle of the rheostat is moved, resistance is cut in or out of each of the three phases.

The starter is operated from one or more push-button stations with three-wire control. A special type of reversing push-button master switch can be provided with the controller for use with cylinder presses. Upon pressing the "run" button the main contactor closes, and the torque resistance is automatically inserted by one of the secondary contactors. When the motor has attained its speed the other contactor closes and cuts out the starting resistor and inserts the speed-regulating resistor. The motor automatically comes to the speed for which the regulating resistor is set. Speed regulation can be accomplished while the motor is running by manually operating the regulating rheostat, which is of sufficient ohmic capacity to allow approximately 50% speed reduction at one-half the rated load of the motor. Low-voltage protection is an inherent feature of this equipment.

Both the starting and regulating resistors are mounted to the rear of the panel in a sheet-iron frame, which is arranged to be mounted on a wall or switchboard by means of four bolts. When the panel is installed in an exposed position so as to be dangerous to workmen, it may be provided with a sheet-metal inclosing case, with the speed-regulating lever outside.



Secondary Resistance Self-Starter With Manually Operated Speed-Regulating Rheostat.

The manufacturer states that this new controller is made in various capacities up to 15 hp. for use on the several commercial voltages not exceeding 550.

New Thermal Demand Meter.

Ruggedness, compactness and simplicity of construction are the mechanical features claimed for a new type of demand meter now being manufactured by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. The instrument employs the principle of thermal storage and indicates what has been termed the logarithmic average demand. The new line of instruments consists of indicating watt demand meters for a-c. circuits, and ampere demand meters for a-c. and d-c. circuits.

The watt demand meter can be used to measure the watt demand in all types of a-c. circuits where it is desired to measure the load with an indicating type of demand instrument. The ampere demand meter is applicable to installations where it is desired to measure the current demand; this type of ampere demand meter is especially applicable in determining the average current in steel-mill and railway work where a motor load varies through a wide range within a very short time.

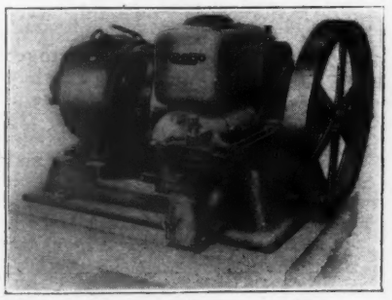
The moving element of the instrument consists of a shaft connected to two bimetallic spiral springs. The springs are attached to the shaft at their inner ends, and to a cylindrical case at their outer ends. The springs are wound in opposite directions so that an equal change in the temperature of both springs does not produce any rotation of the shaft. The instrument is, therefore, independent of atmospheric temperature changes. However, if one spring is raised to a higher temperature than the other, it will deflect through a greater angle than the other, and the shaft will move through an angle which is proportional to the difference in temperature of the two bimetallic springs. Each of the cylindrical cases mentioned above contains a heating element which is connected to the electrical circuit in such a way that one spiral spring is raised to a higher temperature than the other, which results in the shaft deflecting through an angle proportional to the load on the meter.

In the wattmeter, the difference in the temperature of the two spiral springs, and hence the deflection of the shaft, is made proportional to the watts by causing the load current to pass through the heating elements in such a way that in one heater it is additive to a current which is proportional to the voltage and subtractive from the same current in the other heating element. In other words, if E is a current which is proportional to the line voltage, and I is the load current in each element, then the total current in one heating element will be $E + I$ and the other $E - I$. The losses, and hence the heating in the elements, are proportional to the squares of these currents, and it is readily seen that the difference in the heating is the difference between the squares of $(E + I)$ and $(E - I)$, which is proportional to the product EI, or watts. Due to the thermal storage of the cylindrical cases surrounding the bimetallic springs, the wattmeter does not respond instantly to a change in load, but always indicates the logarithmic average load for the time period immediately preceding the instant of observation. The thermal storage capacity of the cases is so designed that the wattmeter gives a deflection equal to 90% of the final deflection in the rated time interval of the meter. This means that a 30-minute meter will give an indication equal to 90% of final indication in 30 minutes, 99% at end of 60 minutes, 99.9% at end of 90 minutes, etc.

The wattmeter has two pointers, one of which, the indicating pointer, is fixed to the shaft, while the other, the maximum demand pointer, is free to remain in the maximum position in which it is placed by the indicating pointer. By observing the indicating pointer the logarithmic demand for the period immediately preceding the instant of observation can be determined. The maximum demand pointer can be reset at any time without removing the cover from the instrument.

Farm Lighting Plant of Simple Design.

Simplicity in design and compactness in size are the claims made by the Rural Electric Equipment Co., Troy, Pa., for its new "Reeco" unit for farm light and power service. The unit consists of a 30-ampere, 32-42-volt generator, directly connected with a special 3-hp. gasolene or kerosene engine by means of a flexible coupling. The engine has high-tension ignition, mechanically operated valves, inclosed crank-shaft and large bronze sleeve bearings. The unit is furnished with 16-cell batteries of 100 ampere-hour capacity and with a complete switchboard.



New Farm Lighting Plant.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Western Electric Co. held a convention of members of its supply sales department at Atlantic City, N. J., during the week ending March 13. Over 100 were in attendance.

Chicago Electrical Engineering Co. has opened offices at 1000 Diversey parkway and will engage in the distribution of electrical apparatus, particularly radio, telephone and telegraph equipment.

Schweitzer & Conrad, Inc., 4421 Ravenswood avenue, Chicago, has issued in its bulletin No. 106, which describes and illustrotes its type X-W switching and protective equipment for farm line service.

The Electric Storage Battery Co., Philadelphia, Pa., announces the appointment of Godfrey H. Atkin as manager of its western district, covering the sales offices, warehouses, service stations and all departments of the company in Chicago, St. Louis, Kansas City, Minneapolis and Denver, with headquarters in the Marquette building, Chicago. Taliaferro Milton succeeds Mr. Atkin as manager of the Chicago office. Both appointments took effect March 1.

Rawson Electrical Instrument Co., Cambridge, Mass., has issued a bulletin giving a complete description of the Rawson portable single-pivot d-c. meters. It is claimed by the company for the single-pivot type of meter that it retains most of the sensitivity of the suspension type, with the important feature of allowing a clamping device which will lift the delicate pivot clear of its jewel and permit of the most severe and rough handling of the meter without injury to the movement.

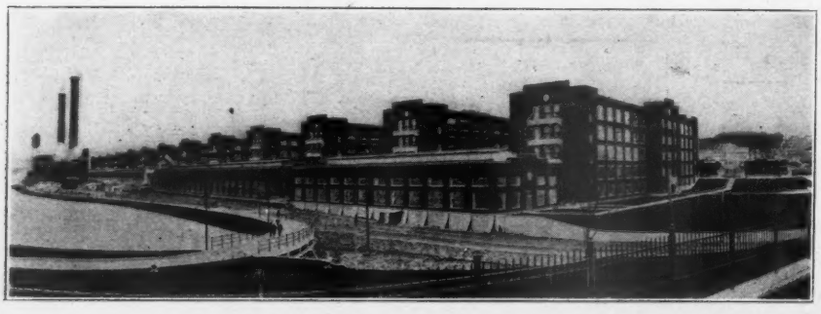
Standard Underground Cable Co., Pittsburgh, Pa., is sending bulletin No. 100-1 to the trade in which the list prices on the various kinds of tubes, rods and wires made by the company are given together with tables giving the weights in pounds per linear foot of seamless copper tubes, iron pipe sizes, brass rods or copper rods. In addition the bulletin gives general information such as the decimal and millimeter equivalents of fractions of an inch, wire gauge comparisons and conversion tables of weights and measures.

Erner Electric Company, Cleveland, O., has placed its advertising in the hands of Frank B. Rae, Jr., and will immediately undertake an aggressive campaign to stimulate the sale of household appliances throughout northern Ohio. The Erner company is completing arrangements for greatly enlarging its facilities, details of which will shortly be made public.

Apex Electrical Distributing Co., Cleveland, O., is issuing a "chummy" weekly paper for its employes under the apt title "Pex-O'-Pep," as the company promises to keep the little paper full of "peppery" items about its employes. The paper will have 12 contributing editors with Oliver B. Capelle, until recently connected with the editorial staff of the Class Journal, New York City, as managing editor.

American Steam Conveyor Corp., 110 West 40th street, New York City, manufacturer of steam ash conveyors, is using the proverb, "A Man Is Known by the Company He Keeps—A Product by Its Users," as the main thought in a little folder it is sending to the trade. The folder simply shows some 50 or 60 trade marks or trade names of nationally advertised and nationally known concerns using the American steam jet ash conveyor and allows those who read the folder to draw their own conclusions.

General Electric Co., Schenectady, N. Y., has announced that on March 17 it leased, with option to purchase, the 40-acre war plant of the Remington Arms Co. at Bridgeport, Conn. The transaction involved about $7,000,000. The plant was built in 1915-16 and is of the latest type of construction. It is located in the industrial center of Bridgeport, in what is known as the East Side. The space covered by the buildings is about 900,000 sq. ft., and the floor area in them is 1,555,257 sq. ft., or over 36 acres. The buildings are divided into four groups, first being 13 main 5-story buildings and the drying kiln, the second being five 1-story buildings, third the power house, and fourth the employment office, guards' quarters and two storage buildings. The buildings are all on the same level, and connected on each story with a corridor which runs through the whole thirteen, much facilitating the delivery and movement of material. The plant is expected to be in full operation by April 15, when the General Electric Co. will employ many thousand people, all of whom can be easily housed, as the facilities already exist. It is not yet known just what products will be manufactured in the new plant.



War Plant of Remington Arms Co. Recently Leased by General Electric Co.

Milliken Brothers Manufacturing Company, Inc., Woolworth Building, New York, manufacturer of transmission towers for high-tension service, radio towers and special buildings, known as Milliken Buildings for power and other industrial service, has taken contracts for a number of these latter structures, including two 1-story shops, 20 by 100 ft., and 40 by 40 ft., for the Boston & Lockport Block Co., Boston, Mass.; 1-story forge shop, 67 by 80 ft., for the Forst Gear & Forge Co., Jackson, Mich.; 1-story machine shop, 40 by 160 ft., for the Lehigh Machine Co., Lehighton, Pa.; and 1-story mechanical building, 47 by 100 ft., for the Mapele Silk Manufacturing Co., Alburtis, Pa. Motors and other electrical equipment will be installed in a number of those buildings. Shipments are also under way of 28 similar buildings to South America, Cuba, and to the Levant. The company has recently taken a contract for the galvanized steel towers for a new electric transmission line in northern New York.

Emerson Electric Manufacturing Co., 2024 Washington avenue, St. Louis, Mo., makers of Emerson and Northwind electric fans, has sent out the following bulletin to dealers: The shortage of fan motors last year has evidently had a similar result in encouraging wholesalers in all sections to place much larger initial stock orders for 1920. Orders already received from wholesalers handling Emerson fans and Northwind fans are in many cases for practically the full requirements of a normal season. With such heavy stocks in the hands of wholesalers at convenient distributing points throughout the country, the dealer or central station handling Emerson fans should be able to feel confident of receiving better service than in previous years. However, retailers also appear to feel some apprehension that stocks will not be adequate next season and early reports indicate that retailers' initial orders for stock exceed those of any previous season. If this abnormally large movement of goods at wholesale is followed promptly by an equivalent volume of retail business, a considerable shortage must be anticipated. Under the circumstances the Emerson company has felt obliged to decline numerous opportunities for establishing new outlets for the distribution of Emerson and Northwind fans, believing that its entire production should properly be reserved to care for the needs of old customers until added facilities make available a surplus of Emerson and Northwind fans.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

DAN RYAN has been appointed auditor of the Sapulpa division of the Oklahoma Gas & Electric Co., succeeding C. W. EVELYN.

ALFRED S. MARCH, New Brunswick, N. J., has tendered his resignation to Governor Edwards as a member of the New Jersey Board of Public Utility Commissioners.

E. E. HAMILTON, formerly of Cumberland, Md., has been appointed assistant to the president of the Philadelphia Co., Pittsburgh, Pa., effective March 15.

GEORGE A. ORROK, mechanical engineer, delivered an address on "Power Production" before the Hartford branch of the Connecticut section of the American Society of Mechanical Engineers on March 16.

GEN. GEORGE H. HARRIES, vice-president of H. M. Byllesby & Co., was the guest of honor at a recent banquet given by the employes of the Mobile Electric Co., Mobile, Ala.

O. E. STERNER, who has been connected with the Ottumwa Railway & Light Co., Ottumwa, Ia., in various capacities for the past 12 years, has been appointed superintendent of construction of the company.

R. W. KECK, a member of the firm of R. W. Keck & Co., Allentown, Pa., was elected vice-president of the Pennsylvania State Electrical Contractors & Dealers' Association, at the recent convention of the organization at Erie, Pa.

M. A. BUEHLER, formerly sales manager at the Omaha branch of the Western Electric Co., has been made sales manager at the Minneapolis office. Mr. Buehler joined the Western Electric organization in the early part of 1915 and became sales manager at Omaha during the fall of 1917.

OSCAR F. BELL has retired as traffic manager of the Crane Co., Chicago, after having been in the service of the company since October, 1892. He was one of the organizers of the National Industrial Traffic League and of the Traffic Club of Chicago, serving as president of the latter organization in 1900 and 1910. J. A. Brough succeeds Mr. Bell as traffic manager of the Crane Co.

W. C. ANDERSON, who has been for three years statistical secretary of the National Electric Light Association, has resigned to accept a position with R. J. McClelland & Co., investment securities brokers, New York City. Mr. Anderson will represent the company in the Wyoming valley section of eastern Pennsylvania with headquarters at Wilkes-Barre, Pa.

JOHN L. SPELLMAN has been appointed publicity manager of the Chicago Telephone Co., succeeding Clifford Arrick, who resigned to accept a position as vice-president of the National City Bank of Chicago. Mr. Spellman was born in Chicago 35 years ago and was educated in the Chicago public schools. For 15 years he has been employed on Chicago morning newspapers, most of the time in "covering" the city hall and writing principally on gas, telephone, traction and electric light matters, in their relations with the City Council and the Illinois Public Utilities Commission. He has been employed at various times by the City Press Association, the Chicago *Tribune*, Chicago *Record-Herald* and the Chicago *Herald and Examiner*. He retired as automobile editor of the Chicago *Tribune* to join the telephone company forces.

ARTHUR W. BERRESFORD, vice-president and general manager of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has been nominated

A. W. Berresford.

for president of the American Institute of Electrical Engineers. Mr. Berresford has been prominent in the work of the Institute for many years and was a member of its board of managers 1909-1912 and vice-president from 1912 to 1914. He is the retiring president of Associated Manufacturers of Electrical Supplies, having served in that capacity during the past two years. Mr. Berresford is also a member of the National Electric Light Association, the American Society of Mechanical Engineers, the Society of Naval Architects and Marine Engineers, Franklin Institute, Society for the Promotion of Engineering Education, Electrical Manufacturers' Club and other organizations.

CARL JACKSON, chairman of the Wisconsin Railroad Commission, will deliver an address at the National Electric Light Association convention in Pasadena, Cal., May 18-22. Mr. Jackson is the first representative of a public utility commission to be asked to speak before the national association.

HARRY M. GARDINER, formerly works engineer of the Olds Motor Works at Lansing, Mich., who has had many years' experience in the automobile manufacturing field, will take charge on April 1 of the Detroit office of the Industrial Controller Co., Milwaukee, as district manager. Mr. Gardiner carries with him the best wishes of a large part of the automotive industries, which have been among the leaders in adopting alternating current control for machine shop motors.

ELIOT LUM has been promoted to the position of sales manager at the Omaha office of the Western Electric Co., to succeed M. A. Buehler. Mr. Lum entered the employ of the Western Electric Co. as a student in the educational courses in 1905, directly after his graduation from college. In 1907 he became a member of the telephone engineering department at Chicago, and in 1909 was transferred to the sales department of the Minneapolis house, joining the Omaha organization in the same capacity in the winter of 1912.

OBITUARY.

LOUIS D. FAUTEAUX, commercial engineer of the Mountain States Telephone & Telegraph Co., died at his home in Denver, Feb. 10, following a 10-day illness with pneumonia. He was 36 years of age.

JAMES KNIGHT, connected with the Flatbush Gas Co., Brooklyn, N. Y., in the capacity of engineer, died on March 16, at his home, 541 Albany avenue, aged 46 years.

THOMAS JOHN NICHOLL, a railroad man of national reputation, died on March 15, at his home, 862 Harvard street, Rochester, N. Y., aged 74 years. Mr. Nicholl was a vice-president and general manager of the old Rochester Railway Co. from 1896 to 1904.

EDGAR F. SHERWOOD, a vice-president of the New York Telephone Co., died March 15 at his home in Glen Ridge, N. J. He was born in New York City in 1862 and had been connected with the telephone company since June, 1879. For many years he was head of its traffic department, then became chief engineer and in October, 1919, was made a vice-president of the company.

MELVIN B. NEWCOMB, aged 31 years, chief engineer of the rubber machinery department of the Wellman-Seaver-Morgan Co., died March 13 after a short illness at his home in Akron, O. Mr. Newcomb received his education at the University of Wisconsin. He had been engaged in engineering work with the I. P. Morris Co., Philadelphia; Allis-Chalmers Manufacturing Co., Milwaukee; Wisconsin Engine Co., Corliss, Wis., and Firestone Tire & Rubber Co., Akron. In January, 1918, he joined the hydraulic turbine engineering department of the Wellman-Seaver-Morgan Co. Mr. Newcomb was a member of the American Society of Mechanical Engineers, the Cleveland Engineering Society, and the Akron Engineering Society. He leaves a wife and two daughters.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Ashland, Mass.—Dr. Sweet's Root Beer, Inc., 10 Postoffice square, Boston, has had plans prepared for the construction of a new 3-story plant and power house, about 65 by 65 ft., to be located at Ashland. The structure will be of brick and reinforced concrete type.

Medford, Mass.—Malden Electric Co., 139 Pleasant street, Malden, Mass., has had plans prepared for the construction of a new 1 and 2-story brick substation, about 58 by 62 ft., at 26 Salem street, Medford.

Pittsfield, Mass.—General Electric Co. is having plans prepared for the construction of two new 1-story brick and steel additions to its plant at Pittsfield, about 100 by 400 ft., for increased operations. The structures will be located on property recently acquired from the Pittsfield Development Co., aggregating about 58 acres.

Westfield, Mass.—The Westfield Manufacturing Co. will erect a new 1 and 3-story plant, 60 by 100 ft.

Worcester, Mass.—The Worcester Eelectric Light Co. will increase its capacity by 20,000 hp. The new work includse the installation of boilers, locomotive crane and other improvements.

Providence, R. I.—The General Electric Co. has taken over the plant of the D. & W. Fuse Co. The plant will continue in operation under the old name, but extensive alterations and additions will be made.

Providence, R. I.—The Narragansett Electric Light Co. will erect a 5-story brick addition to its plant, 76 by 95 ft.

Weymouth, Mass.—Edison Electric Illuminating Co., 70 State street, has had plans prepared for the construction of a new 1-story brick, concrete and steel electric station to be located in the North Weymouth district of Boston.

Ansonia, Conn.—In connection with the construction of the proposed new 2-story and basement brick and concrete addition to the works of the Ansonia O. & C. Co., about 75 by 125 ft., it is understood that the company is arranging for the erection of a new power plant to be used for general factory operation.

Batavia, N. Y.—The Batavia Clamp Co. contemplates erecting a new factory building.

Bridgeport, Conn.—United Illuminating Co. has awarded contract to C. W. Blakeslee & Sons, New Haven, for foundation work in connection with the construction of the proposed new local plant of the company. It is understood that contract for the superstructures will be let at an early date.

Brooklyn, N. Y.—Harding Electrical Co., 367 Nostrand avenue, has increased its capital stock to $50,000, for general business expansion. Notice has been filed with the Secretary of State.

Buffalo, N. Y.—Iroquois Natural Gas Co. has been merged with the Erie County Gas Fuel Co., Ltd.

Buffalo, N. Y.—Notice has been filed with the Secretary of State by the Western New York Utilities Co. of an increase in its capitalization from $300,000 to $1,000,000, for general business expansion.

Buffalo, N. Y.—Pierce Fuse Co. has increased its capital from $200,000 to $500,000 to provide for general business expansion.

Buffalo, N. Y.—Arrangements are being made by the Hydro-Electric Commission, Niagara-on-the-Lake, Ont., for extensive improvements in the local electric distribution system, at Niagara-on-the-Lake, for increased power operations.

Churchville, N. Y.—Application has been filed with the Public Service Commission, Albany, by the local officials for permission to construct and operate an electric lighting and power system for municipal service.

Colonie, N. Y.—Municipal Gas Co., Albany, has filed application with the Public Service Commission, Albany, for permission to construct an extension to its electric plant at Colonie, as well as for approval of a franchise granted by the local authorities.

Far Rockaway, N. Y.—Queens Borough Gas & Electric Co., Central avenue, is considering plans for the construction of a new 2-story brick extension to its local power house, about 38 by 53 ft., on Clinton street, near North Mott avenue. The structure is estimated to cost about $35,000.

New York, N. Y.—Knickerbocker Ice Co., 1480 Broadway, has filed plans for alterations and improvements in its ice-manufacturing plant at 647 West 49th street, to cost approximately $6000, to faciltate operations.

Niagara Falls, N. Y.—The United Statee Heat & Light Co. will build a 2-story plant addition, 80 by 100 ft.

Ogdensburg, N. Y.—The Hudson Brass Co. contemplates buildng a new plant 1 story high, 100 by 300 ft., to cost $65,000.

Poughkeepsie, N. Y.—The Federal Bearing Co. will build a new 4-story plant, 105 by 137 ft.

Rochester, N. Y.—The Seldon Motor Co. is planning a 2-story plant addition, 100 by 140 ft.

Rossie, N. Y.—George N. Wilson and associates have been granted permission by the Public Service Commission to construct and operate a local electric power plant and system.

New York, N. Y.—New York Telephone Co., 15 Dey street, has filed plans for the construction of the proposed new 6-story telephone exchange plant at 121-39 West 73d street. The structure is estimated to cost $1,200,000.

Brockport, N. Y.—Town Council is considering plans for the immediate installation of a new electrically-operated fire alarm system throughout the municipality.

New York, N. Y.—Radio Corp. of America, a Delaware corporation, has filed notice of authorization to operate in New York with C. J. Ross, 233 Broadway, acting as local representative.

Rochester, N. Y.—Alderman & Fairchilds, operating a plant at Churchville for the manufacture of paper boxes, cartons, etc., are understood to be considering plans for the erection of a power plant at this location for general factory operation.

Rochester, N. Y.—Rochester Gas & Electric Corp. has made application to the Public Service Commission for permission to issue stock for $500,000, the proceeds to be used for general expansion. The company's plans include the construction of new additions to the electric department, estimated to cost about $852,100; steam department, $55,000; and gas department, $327,100 and the proposed stock issue will defray a portion of the cost of the above improvements.

Schenectady, N. Y.—Mica Insulator Co., 68 Church street, New York City, has awarded a contract to the Turner Construction Co., 242 Madison avenue, New York City, for the erection of the proposed new plant building at Schenectady. The structure will be 4-story, 50 by 130 ft. and a 1-story building will be erected as an addition to the existing structure. The work is estimated to cost in excess of $125,000.

Schenectady, N. Y.—General Electric Co. is understood to be planning for the construction of a new 1-story punch press shop, about 206 by 600 ft., estimated to cost $700,000, including machinery and equipment installation. The structure will be located on the river road.

Syracuse, N. Y.—H. H. Franklin Manufacturing Co., Geddes street, manufacturer of automobiles, has awarded a contract to the W. J. Burns Co., Keith Theater building, for the construction of a new power plant at its works on South Geddes street, for general factory operation. The structure will be about 68 by 80 ft., and is estimated to cost $200,000, including machinery and equipment installation.

Tonawanda, N. Y.—King Electric Co. has filed notice with the Secretary

of State of an increase in its capitalization from $25,000 to $50,000.

Utica, N. Y.—J. & M. Electric Co. has filed notice with the Secretary of State of an increase in its capital from $100,000 to $200,000, for expansion.

Watertown, N. Y.—Northern New York Utilities Co., 58 Public square, is understood to be considering plans for the construction of a new 1-story power plant, hydroelectric type, including the construction of a new dam on Black river, Watertown, for increased power facilities. James P. Bronwell, 19 Strickland block, Carthage, is engineer and J. B. Taylor president.

Dover, N. J.—The power plant at the works of the McKiernan-Terry Drill Co., including boiler units was recently damaged following the blowing down of a 70-ft. stack at the works due to a high gale in this section.

Newark, N. J.—Notice of organization has been filed by the A. C. Electrical Supply Co. to operate at 287 15th avenue for the production of electrical supplies. Julius Roll, 617 South Nineteenth street, heads the company.

Newark, N. J.—Ware Storage Battery Repairs Shop has completed negotiations for the leasing of property at 60 William street. The company proposes to operate an establishment at this location for the repair of electric storage batteries and kindred equipment.

Newark, N. J.—Shaw Insulator Co., 5 Kirk place, has completed negotiations for the leasing of the 3-story brick factory building at 10 Kirk place, for a new establishment for increased operations.

Newark, N. J.—Electric Service Co. has filed notice of organization to operate at 64 Bank street for the production of electric supplies. Max Richmond, 57 Orchard street, heads the company.

South River, N. J.—Plans have been completed by the Board of Public Works for the construction of the proposed new 1-story municipal power plant, about 55 by 95 ft., to be located at South River. The structure will be of brick type, and is estimated to cost about $125,000 including machinery and equipment installation. Gross, Bryce & Johnson, 55 Liberty street, New York City, are engineers.

Trenton, N. J.—Bender Electric Co. has had plans prepared for the remodeling and alterations of its buildings at 184-86 South Broad street, to facilitate operations. The work is estimated to cost about $22,000. Robert A. Schumann, 932 Lamberton street, is architect.

Trenton, N. J.—Plans are being arranged by the City Commission for the installation of a new electric lighting system in Stacey Park, to extend from Calhoun street to the Log Basin section. The work is estimated to cost about $12,000, and it is understood that work will be inaugurated early in the spring.

Allentown, Pa.—The Aldrich Pump Co., foot of Allen street, manufacturer of steam pumps, etc., has awarded a contract to Butz & Clader, Allentown, for the erection of a large new addition to its machine shop No. 2 for increased capacity. Plans have also been prepared for the construction of a new 2-story administration building, both structures being estimated to cost approximately $50,000.

Chester, Pa.—Considerable electrical and mechanical equipment will be required in connection with the construction of the proposed new 600-ft. drydock at the local plant of the Sun Shipbuilding Co., fronting on the Delaware river, estimated to cost approximately $3,000,000. Arrangements are also being made for the construction of a new wetdock at the works, about 200 by 600 ft., capable of handling three ships at one time. John G. Pew is president.

Philadelphia, Pa.—Contracts have been awarded by the Bell Telephone Co. for alterations and improvements in the administration buildings at 57th and Chestnut streets, and at 17th and Arch streets, to facilitate operations. F. L. Hoover & Co., 1023 Cherry street, has the contract.

Philadelphia, Pa. — Philadelphia Electric Co. has filed notice with the Secretary of State of an increase in its debt from $40,835,000 to $56,335,000.

Philadelphia, Pa.—American Manufacturing Co., Water and Morris streets, manufacturer of rope, has awarded a contract for the construction of a large new plant, to be located on Shunk street, between Swanson and Front streets, estimated to cost approximately $700,000. The work will include main 2-story manufacturing plant, about 150 by 383 ft., 2 and 1-story warehouses, about 150 by 161 ft.; and 99 by 100 ft., respectively; 2-story opening room, 50 by 100 ft., power plant for general factory operation and machine shop, about 32 by 100 ft., and auxiliary structures. It is understood that employment will be provided for over 1500 persons. The Turner Construction Co., 242 Madison avenue, New York City, is the contractor.

Philadelphia, Pa.—The Keystone Auto Supply Co. has awarded a contract for a 4-story factory building, 80 by 140 ft.

Philadelphia, Pa.—In connection with the proposed expansion plans of the Electric Storage Battery Co., 19th and Allegheny streets, plans have been prepared for the construction of a new 4-story and basement brick and concrete manufacturing plant, about 40 by 220 ft., to be located at Ontario and C streets.

Pittsburgh, Pa.—Home Electric Appliance Co., a Delaware incorporation, has filed notice with the Secretary of State of an increase in its capital from $10,000 to $50,000, to provide for general business expansion.

Pittsburgh, Pa.—Pittsburgh Meter Co., East Pittsburgh, manufacturer of gas and water meters, is arranging plans for the erection of a new plant at Pittsburgh. The company is affiliated with the Westinghouse Electric & Manufacturing Co. and this latter organization has acquired a site aggregating about two acres of land at Lang avenue and Susquehanna street, East End district, for a consideration of about $75,000, as a site for the proposed new works.

Pittsburgh, Pa.—Pittsburgh & Allegheny Telephone Co. has filed notice with the Public Service Commission of the placing into effect a new schedule of increased rates for service in Pittsburgh, Monongahela, Allegheny Valley, Ohio Valley and Panhandle districts.

Pittsburgh, Pa.—The Pittsburgh Gear and Machine Co. has plans prepared for a machine shop to cost about $50,000.

Pittston, Pa. — Pennsylvania Coal Co. is arranging plans for the construction of a new 1-story brick and steel electric power plant, about 40 by 40 ft., at its operations, for operation of the works. The structure, including machinery and equipment installation, is estimated to cost about $200,000.

Waynesboro, Pa.—The Victory Tool Co. has broken ground for a 1-story machine shop addition to cost $12,000.

Annapolis, Md.—State Legislature, now in session, is considering a number of bills introduced covering electric utility operations. These are as follows: Bill granting permission to the municipality of Laurel to issue bonds for $20,000 for installation of an electric light plant; to authorize the City Council of Snow Hill to purchase and operate the local existing electric light plant for municipal service; authorizing the construction of a new heating plant at the Spring Grove State Hospital to cost $35,000; heating plant for School for Deaf to cost about $20,000; bill empowering Public Service Commissioners to suspend proposed changes in rates, fares and charges; and a bill providing for the licensing of all persons employed in stringing electric wires of any kind, to be placed under the jurisdiction of a board of seven members, one of whom shall be the electrical engineer of the City of Baltimore.

Baltimore, Md.—Contract has been awarded by the Columbia Graphophone Co., Bridgeport, Conn., to the M. A. Long Co., Baltimore, for the erection of the proposed new local manufacturing plant, estimated to cost in excess of $1,000,000. The works will include manufacturing buildings, as well as a power plant, about 85 by 100 ft., for general factory operation.

Baltimore, Md.—Board of Managers of Morgan College is having plans prepared for the installation of a new central heating plant at the institution. Edward L. Milton, 52 Vanderbilt avenue, New York City, is architect; O. Spencer is president of the board.

Baltimore, Md.—Considerable laundry machinery, etc., will be required in connection with the construction of the proposed new 1-story laundry building, about 137 by 152 ft., of the Empire Laundry Co. to be located at Garey and Winchester streets, estimated to cost approximately $50,000.

Baltimore, Md.—Novelty Steam Boiler Works, 917-29 South Howard street, has awarded a contract for the erection of a new 1-story covered crane runway at their plant, estimated

to cost $12,000. It is understood that an electrically - operated traveling crane will be installed.

Denton, Md.—Plans are under consideration by the town officials for the construction of a new municipal electric light and power plant, estimated to cost about $40,000.

Washington, D. C.—A bill is being formed to be introduced by Representative James P. Woods, Virginia, authorizing the consolidation of the Potomac Electric Power Co. with the Washington Railway & Electric Co., both of Washington.

Richmond, Va.—Virginia Central Telephone Co. has been granted permission by the State Corporation Commission to increase its rates for service in Buckingham county from $15 to $20 per annum.

Millville, Va.—Waynesboro Electric Light Co., Waynesboro, is understood to have completed arrangements for the installation of a new 6,000-kw. unit at its local plant, for increased operation. Emory L. Coblentz is president.

Warrenton, Va.—Warrenton Electric Light & Power Co. is planning for extensive improvements in its plant, including the installation of a quantity of new equipment. Plans have been prepared for the construction of a new 5-mile transmission line, as well as the installation of new electric street-lighting system. M. J. O'Connell is secretary-manager.

Fairmont, W. Va.—In connection with proposed improvements and extensions in the plants and system of the Monongahela Valley Traction Co., arrangements are being made for the installation of a large new generating unit at the company's power plant, estimated to cost $700,000 to double approximately the present capacity. The company's expansion program includes increasing the capacity of its power plant at Parkersburg, as well as the purchase of a quantity of new rolling stock.

Wheeling, W. Va.—Following the appointment of a receiver for the West Virginia Traction & Electric Co., the holdings have been sold at public sale to G. H. Walbridge, New York City, for a consideration of $740,000. The property includes the traction lines, rolling stock, gas and water property and other subsidiaries of the company.

Chadbourn, N. C. — Fire, which caused a damage of about $31,000, destroyed the power plant and boiler house at the Brown Hotel, operated by J. A. Brown.

Kinston, N. C.—Plans are being arranged by the Chesterfield Manufacturing Co. for the installation of a new hydroelectric power plant on Swift creek. The company has completed work on the construction of a new 500-ft. concrete dam at this place.

NORTH CENTRAL STATES.

Anderson, Ind.—McCullough Hotel Co. will erect $400,000 hotel building.

East Chicago, Ind.—Steel and Tube Co. will erect a Bessemer converting works at its Indiana Harbor plant. Gary has one Bessemer plant and South Chicago three. Indiana Harbor has been active in the steel industry with the Inland Steel, Mark Manufacturing plant, Steel and Tube Co. of America and Interstate Steel and Republic Steel mills, but none of the companies has a Bessemer plant. The Steel and Tube Co. now produces open-hearth steel at its Indiana Harbor plant and gets its Bessemer steel from its South Chicago plant.

Decatur, Ind.—The Decatur Castings Co., a branch of the Hoover-Owens-Rentschler Co., of Hamilton, O., will open a plant here and make castings for the General Electric Co., the Fordson Tractor Co., the Willys-Overland Co. and others. Gordon Rentschler, of Hamilton, has arrived in Decatur, with a number of assistants and will supervise the erection of a number of factories.

Evansville, Ind.—Seiffert Electric Co. has increased its capital stock from $30,000 to $100,000.

Evansville, Ind.—The Public Utilities Co. has elected the following directors to serve during the ensuing year: William H. McCurdy, S. W. Cook, C. W. Cook, Henry E. Dyer, H. C. Kleymeyer, Daniel H. Ortmeyer and F. J. Haas, all of Evansville, Ind; and B. C. Cobb and W. E. Bartholt of New York. All of the directors were re-elected except Mr. Kleymeyer, who was chosen to succeed Henry W. Marshall, of Lafayette, Ind. Officers were elected as follows: B. C. Cobb, president; W. H. Barthold, vice-president; general manager, F. J. Haas; secretary, O. E Oswald, and treasurer, Charles B. Froelich.

Gary, Ind.—National Spring Products Co. will erect a 4-story building to cost $500.000. The plans also include the building of workingmen's homes on a 31acre tract. The total building program of the company calls for an investment of $2,000,000.

Gary, Ind.—Construction of two merchant and one billet mill is under way in the Gary steel works at a cost of $2,500,000.

Indianapolis, Ind.—Leedy Manufacturing Co. will erect a 3-story building of reinforced concrete, 50 by 80 ft., to cost $75,000.

Indianapolis, Ind.—Fire destroyed the plant of the Chapman-Price Steel Co. with loss of $200,000. The building was 200 by 325 ft. and contained valuable machinery. The company was organized last July by the consolidation of the Chapman Steel Co. and the Hornbrook-Price Co. The office of the company, 150 ft. from the plant, and the truck barns were not destroyed.

Indianapolis, Ind.—Acme Aluminum and Brass Works has increased its capital stock from $40,000 to $200,000.

Muncie, Ind.—Hoosier Auto Parts Co. has increased its common capital stock from $100 000 to $150,000 and has issued $300,000 preferred stock.

East St. Louis, Ill.—The East St. Louis City Council has passed an ordinance establishing a board of examiners for electricians and making it necessary for them to pass examinations before working in the city. Applicants must pay a fee of $6 before taking the test.

Galena, Ill.—The city of Stockton has been connected to the lines of the Lena Light & Power Co. which purchases electric current from the Interstate Light & Power Co. on a wholesale basis.

Galesburg, Ill.—That part of the Rock Island Southern Railway Co., an interurban line extending from Monmouth to Galesburg has been sold to W. S. Shammons of Portland, Me., for $151,000.

Moline, Ill.—The Moline Forging Co. has changed its name to the Moline Forge Co.

Rock Island, Ill.—The Electric Construction and Machinery Co., manufacturers of electrical machines, has increased its capital stock from $5000 to $25,000.

Flint, Mich.—The Buick Motor Co. has arranged a program to total about $10,000,000 for new construction during the present year. Of this amount $7,500,000 will be expended for new buildings and equipment at the local works, while the remainder, $2,500,000, will be used for an assembling plant at St. Louis. Nine new buildings will be constructed at Flint and other enlargements made to allow for a capacity of 550 automobiles per day. The St. Louis plant will be equipped to assemble 200 cars daily, the chassis units being sent to this point for assembling; bodies for the cars will be built at this latter works. H. H. Barsett is president.

Pontiac, Mich.—The Oakland Motor Car Co. has arranged for the erection of additions to its plant to cost about $3,000,000. Three new factory units will be constructed to cost $2,500,000 with equipment; one will be equipped for assembling work and the others for general operations. It is proposed to develop a capacity of 320 cars a day and to have a portion of the new works ready for service early in July. A new administration building, construction of which has been inaugurated, is estimated to cost $500,000. Fred M. Warner is president.

Cleveland, O.—Buckeye Brass Co., 6410 Hawthorne avenue, will let contracts for building 1-story foundry and furnace room, brick and steel construction at a cost of $60,000. A. Sogg, 319 Hippodrome building is architect.

Cleveland, O.—Cleveland Automobile Co., is having plans prepared for a 1-story heat-treating plant, 80 by 80 ft., of concrete, steel and brick construction, to cost $60 000. E. McGeorge, 1900 Euclid avenue, Cleveland, is architect and engineer.

Milwaukee, Wis.—Republic Carbon Co., a Delaware incorporation, has filed notice with the Secretary of State of an increase in its capital from $2,500 000 to $9,000,000 for general business expansion.

Dilworth, Minn.—A transmission line between Dilworth and Glyndon, Minn., and distribution system at Glyndon have been completed and current was turned on by the Union Light, Heat & Power Co. on March 6. The village buys current on a wholesale basis from the company. Over 70 lighting customers have already been connected.

Sabin, Minn.—The Union Light,

Heat & Power Co. has been asked by the local electric company to prepare plans and specifications for a transmission line and distribution system to connect with the Glyndon transmission line near Dilworth.

Carthage, Mo.—F. H. Lynch Tire Co. will erect a $200,000 motor car tire factory.

SOUTH CENTRAL STATES.

Harrodsburg, Ky.—The D. T. Bohon Co., manufacturer of wagons, buggies, parts, etc., has increased its capital stock from $150,000 to $1,000,000. Plans are also being prepared for a 2-story addition to its plant, 80 by 200 ft.

Meridian, Miss.—The Perry Rotary Fixture Co. will equip a plant to manufacture motor speed changing devices, etc. Gus C. Kendall is president.

Crystal Springs, Miss. — Town Council is considering the plan of having citizens vote on issuing $15,000 bonds for improving the town lighting service.

Shaw, Miss.—City proposes to issue $30,000 in bonds for the improvement of the water and light facilities.

Fort Smith, Ark.—The Seaman-Packard Lumber Co. will equip a mill and will require about $200,000 worth of machinery. W. L. Seaman is president.

Stamps, Ark.—The Stamps Light & Power Co. is in the market for about $20,000 worth of machinery. J. M. Hudgens is president.

Davidson, Okla. — The Davison Farmers' Gin Co., in which J. A. Henderson and others are interested, is in the market for about $35,000 worth of cotton gin and power plant equipment.

El Reno, Okla.—Oklahoma Gas & Electric Co. has completed arrangements for the issuance of notes for $3,500,000, for additional working capital, etc. J. J. O'Brien is president.

Garber, Okla.—The Excel Tool Co. will install about $20,000 worth of new man machinery for the manufacture of tools.

Dartmouth, Tex.—City has appropriated $4000 for the establishment of a street-lighting system.

Slaton, Tex.—Lewis H. Fuller is arranging plans for the installation of a new local electric light and power plant.

WESTERN STATES.

Denver Colo.—Denver Gas & Electric Light Co. has arranged for a note issue for $2,000,000, the proceeds to be used for general business expansion. The company is under the management of the Cities Service Co., 60 Wall street, New York City.

Seattle, Wash.—United States Government, Navy Department, has awarded a contract to Swensson & Co., Seattle, for the construction of a new addition to the central power plant at the navy yard, Bremerton, estimated to cost about $50,000.

Seattle, Wash.—Herbert T. Condon, comptroller of University of Washington, has taken bids for the installation of a new 500-hp. engine-driven slow-speed generating unit at the power plant at the institution.

Olympia, Wash.—Plans are being arranged by the city officials for the installation of a new cluster type electric street-lighting system in the downtown district. The work is estimated to cost approximately $20,000.

Burlingame, Cal. — City Trustees have had plans prepared for the installation of a new electrolier lighting system in Main street. J. R. Murphy is city clerk.

Emeryville, Cal.—Johnson Electric Washer Co., manufacturer of electrically-operated washing machinery, etc., has awarded a contract to the Austin Co., Pacific building, San Francisco, for the construction of a new 1-story brick and mill type addition to its plant, about 120 by 234 ft., to cost $40,000.

Eureka, Cal.—Pacific Lumber Co. has recently awarded a contract to the Eureka division of the Western States Gas & Electric Co. for furnishing a connected load of 2000 kw. to be used for logging purposes.

Fresno, Cal.—San Joaquin Light & Power Corp. is arranging plans for the construction of a large new natural gas burning steam-generating plant in the oil district of Kern county, to have a capacity of about 15,000 hp. The project is estimated to cost approximately $1,000,000.

Los Angeles, Cal.—Sespe Light & Power Co., 305 Merchants Trust building has increased its capital from $1,000,000 to $2,000,000, and arranged for the issuance of bonds for $10,000,000, to provide for general business expansion. M. M. Baker is secretary.

Los Angeles, Cal.—In connection with the construction of electrical and steam distributing system and power plant equipment for the marine base at San Diego, Spec. 4118, for the United States Government, the Thomas Haverty Co., Eighth and Maple avenue, has submitted the low bid, at $189,650. The work includes the construction of electrical and steam distributing systems, and the equipment installation includes two oil-burning boilers, oil-pumping equipment, feed-water heater, boiler-feed pumps, two engine-driven alternators, one engine-driven and one motor-driven exciter, switchboard, transformers, electrical connections, and auxiliary apparatus.

Los Angeles, Cal.—Southern California Edison Co. has arranged for the issuance of stock for about $4,500,000, the proceeds to be used to provide for new hydroelectric construction for the company.

San Francisco, Cal.—Application has been filed with the State Railroad Commission by the San Francisco, Napa & Calistoga railway for permission to construct a single track standard gage electric railway across Nebraska and Mississippi streets, Vallejo, at grade.

San Francisco, Cal.—Sierra & San Francisco Power Co. is arranging plans for the utilization of a total of 150 cu. ft. per second of water from the south fork of the Stanislaus river, for power purposes, permission for which was recently granted.

INCORPORATIONS.

Indianapolis, Ind.—Criterion Motors Co. has been incorporated under Delaware laws with capital stock of $1,000,000. Walter J. Leinbach, Victor R. Chandler and F. Edward Dean, of Indianapolis, are incorporators.

Indianapolis, Ind. — Van Briggle Manufacturing Co. has been incorporated with capital of $1,000,000 by L. H. Van Briggle, Henry S. Rominger and George A. Weidely.

Peru, Ind.—The Automotive Parts Manufacturing Co. has been incorporated with capital of $25,000 by Joseph C. Whisler, William H. Church and William H. Haupert.

Marion, Ind.—The Wiley Machine and Tool Co. has been incorporated with capital of $15,000 for the manufacture of machine tools. The incorporators are L. M. Wiley, R. R. Wiley and R. B. Wiley.

Union City, Ind.—The Bailey Manufacturing Co. has been incorporated with capital of $50,000 for the manufacture of automobile parts by P. I. Turner, N. H. Parker and H. I. Willcutts.

Indianapolis, Ind.—Aluminum Castings Co. has been incorporated with a capital of $1,000,000, to do a general foundry business. The incorporators are H. C. Smith, W. R. Macy and W. H. Breeden.

New York.—A. Robinson & Co., Inc. Under Delaware laws. Capital, $100,000. To manufacture electrically operated devices, etc. Incorporators: Harry C. Hand, S. B. Howard, and Robert K. Thistle, New York.

New York, N. Y.—Morgan Crucible Co. of America, incorporated under Delaware laws. Capital, $3,000,000. To manufacture electrical machinery, etc. Incorporators: Ira L. Anderson, East Orange, N. J.; George W. Edwards, Bellrose, N. Y.; and Harry E. C. Mills, New York.

New York. N. Y.—Colonial Chandelier Works. Capital, $100,000. To manufacture lighting fixtures. Incorporators: G. S. Fulton and J. and H. W. Gross, 1017 Intervale avenue.

Syracuse, N. Y.—Willys Light & Power Co. Capital, $10,000. To operate a local electric light and power plant. Incorporators: C. B. and V. I. Wheeler, and C. A. Schneider.

West New York, N. J.—Hudson Electric Appliance Co., Inc. Capital, $25,000. To manufacture electrical appliances. Incorporators: M. Davis, M. H. Rosenberg, and D. J. Delaney.

Buffalo, N. Y.—Stafford Electrical Co. Capital, $10,000. To manufacture electrical goods. Incorporators: H. C. and E. J. Stafford, and L. Jaworski, Buffalo.

Washington, D. C.—American Accumulator Co. Incorporated under Delaware laws. Capital, $500,000. To manufacture electric batteries, etc. Incorporators: Arthur E. Marsh, Abraham Eisner, and Louis A. Miller, Washington.

Somerset, Ky.—Eastern Kentucky Light & Power Co. Capital, $10,000. To operate a local electric light and power plant. Incorporators: S. D. J. and O. H. Dunlap, and H. H. Gabbert.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Oklahoma Gas and Electric Co. Gold Bonds Offered for Sale.

H. M. Byllesby & Co. and Bonbright & Co. are offering $3,500,000 Oklahoma Gas & Electric Co. one-year 7% bond secured gold notes at 99¼ and interest to yield over 7¾%. Proceeds from sale of these notes, together with cash in the treasury of the company, will provide funds for the retirement of $3,650,000 one-year 7% gold notes due April 1. Participations from dealers have been reported in excess of the amount offered, and it is expected that the issue will be immediately sold.

Western Electric Co.

Western Electric Co., including its owned subsidiaries, the Western Electric Co., Inc., of Delaware, and Western Electric Co., Inc., of California, earned $5,652,089 for the year ended Dec. 31, 1919, on total sales of $135,722,489. The condensed balance sheet of the company follows:

ASSETS.

Real estate and buildings	$14,704,310	
Machinery and equipment	15,839,796	
Total plant		$ 30,544,106
Merchandise	$45,097,345	
Cash	4,914,238	
Bills receivable	1,335,015	
Accounts receivable	29,526,549	
Total current assets		$80,873,147
Liberty Bonds (market value).		2,303,391
Sundry investments (market value)		1,396,639
International Western Electric Company, Incorporated		13,372,642
Grand total		$128,489.925

LIABILITIES.

Preferred stock, 300,000 shares	$30,000,000	
Common stock, 150,000 shares, no par value	27,054,594	
First mortgage bonds, 5%, 1922	15,000,000	
Total capital liabilities		$ 72,054,594
General bills payable	13,500,000	
Bills payable secured by Liberty Bonds	2,020,000	
Accounts payable	14,217,480	
Total current liabilities		29,737,480
Reserve for depreciation on plant	20,264,379	
Reserve for Employes' Benefit Fund	1,600,000	
Reserve for contingencies	4,833,472	
Total reserves		26,697,851
Grand total		$128,489,925

EARNINGS.

Sales		$135,722,489
Other income		854,578
		$136,577,067
Cost of merchandise	$118,420,440	
Expenses	10,986,139	
Taxes	1,518,399	
		130,924,978
Available for interest and dividends		$ 5,652,089
Interest paid	$ 1,263,180	
Dividends:		
Preferred stock, 6%	1,800,000	
Common stock, $10 per share	1,500,000	
		4,563,180
Balance carried to common stock		$ 1,088,909

Michigan State Telephone Co.

Michigan State Telephone Co. has issued its annual report for the year ended Dec 31, 1919, showing operating revenues of $4,937,373; net after taxes of $163,855; other income of $111,102; Federal compensation of $962,478; giving gross income of $1,237,436; after interest and rental deductions there was deficit of $274,892, which after payment of dividend appropriations left made total deficit for year of $454,892.

Habirshaw Electric Cable Co.

Orders received by the Habirshaw Electric Cable Co. and constituent companies, for the month of January, amounted to $1,502,000, February $1,441,000, and for the first fifteen days of March $930,000. The plants of the company are running day and night. The company has sold to a syndicate headed by Potter Brothers & Co. $2,600,000 7% 15-year convertible debenture gold bonds and 40,000 shares of common stock, which will shortly be offered to the public. The new money will be used to retire $177,000 bonds of the company and for additional working capital.

Electric Storage Battery Co.

The Electric Storage Battery Co. reports for the year ended Dec. 31, 1919, a total net, after charges, but before federal taxes, of $4,800,812, equivalent, after preferred stock dividends, to $28.96 a share on $16,561,925 common stock, compared with $3,949,373, or $24.45 a share on $16,129,925 common stock in 1918. The federal taxes for 1919 are estimated at $2,000,000. Allowing this amount it would show a net of $2,800,812, or $16.88 a share on the common stock.

Regular Cities Service Co. Dividends.

The Cities Service Co. has declared the regular monthly cash dividends of ½% on the 6% cumulative preferred stock, ½% on the preference B stock and ½% on the common stock, and also the regular monthly dividend of 1¼% on the common stock, payable in common stock at par. all dividends are payable May 1 stockholders of record April 15. Directors of Cities Service Co. have extended to holders of Cities Service series C 7% convertible gold debentures the privilege of converting into stocks, as provided in the debentures, 10% of the principal amount of series C debentures held by them March 1 on April 1, or the first day of any month thereafter.

Dividends.

The New England Telephone & Telegraph Co. has declared its usual quarterly dividend of 1¾% payable March 31 to stockholders of record March 17.

The Duquesne Light Co. has declared the usual quarterly dividend of 1¾% on the preferred stock, payable May 1 to stockholders of record April 1.

The Philadelphia Co. has declared its regular quarterly dividend of 1½% on the common stock, payable April 30 to stockholders of record April 15, and the usual semi-annual dividend of 3% on the 6% preferred stock, payable May 1 to stockholders of record April 1.

The Pacific Gas & Electric Co. has declared its regular quarterly dividend of $1.25 a share on the common stock, payable April 15 to stockholders of record March 31.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Mar. 16.	Bid Mar. 23.
Adirondack Electric Power of Glens Falls, common	6	12	11
Adirondack Electric Power of Glens Falls, preferred	6	78	77
American Gas & Electric of New York, common	10+extra	119	125
American Gas & Electric of New York, preferred	6	38	38
American Light & Traction of New York, common	..	192	188
American Light & Traction of New York, preferred	6	89	89
American Power & Light of New York, common	4	59	65
American Power & Light of New York, preferred	6	69	68
American Public Utilities of Grand Rapids, common	..	4	4
American Public Utilities of Grand Rapids, preferred	7	20	15
American Telephone & Telegraph of New York	..	99½	100½
American Water Works & Elec. of New York, common	..	3	3
American Water Works & Elec. of New York, particip	7	4	8
American Water Works & Elec. of New York, first preferred	..	48	45
Appalachian Power, common	..	3	2
Appalachian Power, preferred	7	21	19
Cities Service of New York, common	+extra	380	385
Cities Service of New York, preferred	6	70	70
Commonwealth Edison of Chicago	8	106	106
Comm. Power, Railway & Light of Jackson, common	..	18	18
Comm. Power, Railway & Light of Jackson, preferred	6	37	39
Federal Light & Traction of New York, common	..	5	6
Federal Light & Traction of New York, preferred	..	46	43
Middle West Utilities of Chicago, common	..	18	18
Middle West Utilities of Chicago, preferred	..	38	39
Northern States Power of Chicago, common	..	50	50
Northern States Power of Chicago, preferred	ex.div.7	84	87
Pacific Gas & Electric of San Francisco, common	..	47	48
Public Service of Northern Illinois, Chicago, common	7	74	78
Public Service of Northern Illinois, Chicago, preferred	6	85	83
Republic Railway & Light of Youngstown, common	4	19	17
Republic Railway & Light of Youngstown, preferred	6	53	54
Standard Gas & Electric of Chicago, common	..	18	20
Standard Gas & Electric of Chicago, preferred	6	38	40
Tennessee Railway, Light & Power of Chattanooga, common	..	1½	1½
Tennessee Railway, Light & Power of Chattanooga, preferred	6	7½	6
United Light of Railways of Grand Rapids, common	4	26	25½
United Light & Railways of Grand Rapids, common	6	64	63
Western Power of San Francisco, common	..	18	17
Western Union Telegraph of New York	extra	87	70
Industrials—			
Electric Storage of Philadelphia, common	4	105	105
General Electric of Schenectady	8	170	170
Westinghouse Electric & Mfg. of Pittsburgh, common	7	52	52